MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: FRANK OWEN STETSON.

VOL. XXXIII. JUNE, 1905. No. 6

INTRODUCTION.

The MONTHLY WEATHER REVIEW for June, 1905, is based on data from about 3486 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 176; West Indian Service, cable and mail, 4; River and Flood Service, regular 52, special river and rainfall, 363, special rainfall only, 98; cooperative observers, domestic and foreign, 2565; total Weather Bureau Service, 3258; Canadian Meteorological Service, by telegraph and mail, 33; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25. Total, 3486.

Since December, 1904, the Weather Bureau has received an average of about 1700 reports from as many observers and vessels, giving international simultaneous observations over the Atlantic and Pacific oceans at 12 noon, Greenwich time, or 7 a. m., seventy-fifth meridian time. These are charted, and, with the corresponding land observations, will form the framework for daily weather charts of the globe.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S.I. Kimball, General Superintendent of the United States Life-Saving Service; Commander H. M. Hodges, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; and Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that at regular Weather Bureau stations all data intended for the Central Office at Washington are recorded on seventy-fifth meridian or eastern standard time, except that hourly records of wind velocity and direction, temperature, and sunshine are entered on the respective local standards of time. As far as practicable, only the seventy-fifth meridian standard of time, which is exactly five hours behind Greenwich time, is used in the text of the REVIEW. The standards used by the public in the United States and Canada and by the cooperative observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^h\ 36^m$ west of Greenwich.

Barometric pressures, whether "station pressures" or "sea-level pressures", are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

In conformity with Instructions No. 43, March 29, 1905, the designation "voluntary", as applied to the class of observers performing services under the direction of the Weather Bureau without a stated compensation in money, is discontinued, and the designation "cooperative" will be used instead in all official publications and correspondence.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Several barometric depressions of moderate intensity appeared over the eastern Atlantic, the most important of which moved slowly northward west of the British coasts during the second decade of the month with reported barometric readings of 29.44 inches at Valentia on the 17th, and 29.42 at Malin Head, Ireland, on the 20th. From the 5th to 7th and 24th to 27th disturbances advanced northward over western continental Europe with areas of high barometric pressure over the British Isles. During the 29th and 30th a disturbance moved from a position off the south coast of Ireland over northwestern France. In the vicinity of the Azores the barometer was uniformly high, except from the 14th to the 20th, when a disturbance, above referred to, occupied the ocean west of the British Isles. The disturbances that advanced over the Atlantic Ocean from the American coast were of moderate strength.

In the United States rains were frequent and heavy in the north and west-central portions of the country during the first and second decades of the month, the severest storms of this period occurred in lower Michigan and eastern New York under conditions that attended low area No. V. A detailed description of the tornadic storm that visited Binghamton, N. Y., the night of the 5th, appears elsewhere in this issue of the REVIEW. During the afternoon of the 30th, severe local storms occurred in the middle and upper Mississippi Valley, within the field occupied by low area No. XII.

The important floods of the month occurred in the upper Mississippi, Red, and Rio Grande rivers, all of which are discussed under the heading "Rivers and Floods." The flood stages in Arkansas and northwestern Louisiana were accurately forecast and special warnings were sent to inundated districts ten days in advance of the flood. The month opened with flood stages in the Rio Grande River, in New Mexico, and the fluctuations in that river were accurately forecast.

BOSTON FORECAST DISTRICT.

The weather was much cooler than the average for the month and the monthly mean temperatures were below the normal at nearly all stations. The minimum temperatures occurred during the first decade, and light to killing frosts were reported, mostly on the 2d and the 9th, in parts of all the New England States, except Rhode Island. Little if any damage resulted from the frosts. The precipitation was decidedly in excess of the average and positive departures were noted at nearly all stations. The month was devoid of stormwinds or gales and there was no delay to shipping, except from fog, which was somewhat more prevalent than usual for this month. No storm warnings were issued during June, 1905.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

No well-marked disturbance crossed the district during the month, and no special warnings were issued. Scattered thunderstorms, which were generally covered in the forecasts, occurred on several dates. There were frequent rains, especially during the last decade.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

No storm warnings were ordered and no general storms for which warnings should have been ordered occurred on the upper Lakes.

A forecast of light frost in the cranberry district was issued on the 21st, and, according to reports, the forecast was verified. It is believed, however, that no damage was done to the cranberry crop.—*H. J. Cox, Professor and District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

No unusual storms passed over the district during the month, though during the middle and latter half there were frequent thunderstorms and heavy rainfalls. After the 18th, there was not a day on which more or less heavy and general showers did not occur over the district. The first ten days, however, were mostly fair and warm. The thermal condition of the month was about normal, with no marked departures.—*Ferdinand J. Walz, District Forecaster.*

DENVER FORECAST DISTRICT.

No unusual weather conditions prevailed.

As a result of the melting of snow in the higher mountains of Colorado, streams on all slopes of the Continental Divide were badly swollen during the first half of the month. Considerable damage resulted in the vicinity of Florence, on the Arkansas, and also in the southwestern part of Colorado.

In the Rio Grande, at El Paso, the highest stage was reached the morning of the 1st, after which there was a gradual decline until the 8th, when, as a result of heavy rains, there was a material rise in the river for 200 miles north of El Paso. After the 17th, the river, in its lower reaches, fell steadily.

These different stages were accurately forecast, as was also a moderate rise in the Arkansas for a short distance below Pueblo.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The season continues abnormal. There appears to have been a permanent depression over the southwestern portion of the country. The Pacific "high" may be inferred to have either swung somewhat westward or lost energy. The season has been cool and it is reported by masters of transpacific steamers that not for ten or more years has it been so cool on the Pacific.

No rain has fallen in California. A few thunderstorms in the mountains were reported. The locus of unsettled weather was in northeastern Nevada, southern Idaho, and northern Utah.

No storm warnings were issued during the month.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was showery and cooler than usual. No special warnings were issued or needed, except for a slight rise in the Columbia River, due to melting snow in the mountains. Ordinarily the Columbia River is in flood during the months of May and June, but this year the rise was so small as to cause but little inconvenience. The highest stage at Portland occurred June 16, and it was only 13.6 feet, which is the lowest spring high water that has occurred during the last 26 years, with the exception of the year 1889, when the highest stage reached was ten feet.

The public was advised early in April that the winter snowfall in the mountains within the drainage area of the Columbia River was the smallest in many years, and consequently the low stages that followed were anticipated.

Mr. A. B. Wollaber made the forecasts from June 1 to June 17, inclusive, and the undersigned during the remainder of the month.—*Edw. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The reputation of June as a month of floods was well sustained during the present month. There was a short but very destructive flood in the upper Mississippi and its tributaries during the first half of the month, which, however, did not extend below the mouth of the Illinois River; another great flood in the Grand River of Michigan, almost as extensive as the overflow of the previous year; continued floods in the Rocky Mountain States, doing still more damage to railroads, bridges, and farms; a moderate but greatly prolonged flood in the Red and Ouachita rivers, some close approaches to the danger lines in the lower Arkansas, and some local floods in the interior of New York. The Mississippi River flood, and also that in the lower Des Moines River, began on the 10th from La Crosse to Hannibal, and were due to the heavy downpour of rain on the 9th and 10th. At Leclaire, Iowa, the rainfall for 24 hours was 4.41 inches; at Davenport, Iowa, 4.59 inches; at Burlington, Iowa, 6.04 inches; at Keokuk, Iowa, 4.68 inches, and at Warsaw, Ill., 4.00 inches. In the lower Des Moines Valley the rainfall was torrential, 10.09 inches having fallen in 12 hours at Keosauqua, Iowa.; 10.63 inches in 12 hours at Stockport, Iowa, and 12.10 inches in 12 hours at Bonaparte, Iowa. There could be but one result from such a torrent of water. The lower Des Moines Valley at once became an inland sea. The rain and rising waters came so suddenly that no special warnings were practicable. At Keosauqua, Iowa, the river rose 16.3 feet in seven hours to a stage of 20.2 feet, and finally reached 23.5 feet during the afternoon of the 10th. This stage was 0.2 foot higher than the high-water mark of 1851, 1 foot higher than that of 1897, and 4 feet below that of 1903, the highest stage of record.

The torrent from the Des Moines River speedily passed into the Mississippi and at Keokuk, Iowa, the combined effect of the upper Mississippi, the Cedar, Iowa, Skunk, and Des Moines rivers caused a rise of 8.4 feet to a stage of 18.4 feet during the 19 hours ending at 2 p. m. June 10. At Warsaw, Ill., at the mouth of the Des Moines River, the rise was 8.2 feet in 28 hours to a maximum of 21.3 feet, 3.3 feet above the danger line.

It is impossible to give an accurate estimate of the damage caused by these floods. Farms and railroads were the greatest sufferers, and the losses from various causes must have amounted to millions of dollars. Estimates varying from $5,000,000 to $15,000,000 have been received. Very fortunately the loss of life was small, only two fatalities having been reported.

The following report on the flood in the Keokuk, Iowa, district was made by Mr. F. Z. Gosewisch, Official in Charge of the U. S. Weather Bureau office, Keokuk, Iowa:

On Friday, June 9, the river was falling at the rate of 0.2 to 0.3 foot a day, with every indication that this rate of fall would continue for several days. At 5 p. m. the stage was 10.0 feet, with the river still falling.

During the afternoon light showers fell, but at 8.30 p. m. heavy thunderstorms began, and by 9.15 a. m. of the 10th, 4.62 inches of rain had fallen, with a total of 4.80 inches for the 24 hours.

The river began to rise rapidly at midnight, rose four feet by 7 a. m. of the 10th, and reached the highest stage, 18.4 feet, by 2 p. m., a rise of 8.4 feet in fourteen hours.

It was apparent from the rapidity with which the river rose that the flood was due entirely to excessive rains within the immediate vicinity of the Mississippi and Des Moines rivers.

From Nashville, Iowa, seven miles north of Keokuk, it was reported that a square box, freely exposed on the bow of a boat, received twelve inches of water, and at Hamilton, Ill., opposite Keokuk, a mortar box is said to have received ten inches of rainfall.

The rise was so sudden and unexpected that there was no opportunity for sending telegraphic warnings. In fact, on the morning of the 10th telegraphic service was so badly interrupted that the first reports were not received until 12.30 p. m.

The Weather Bureau office at Hannibal was given the morning report

by telegraph, and at 2 p. m. all available information was telegraphed, consisting of the stage of river at Keokuk and Warsaw, and the special reports from Des Moines, Iowa City, and Mount Pleasant.

Between 8 and 9 a. m. the Egyptian levee, on the south bank of the Des Moines River, broke in three places at points from five to eight miles above the mouth of the river, flooding a tract of land ten miles long by eight miles wide in Clark County, Mo. These lands were mostly planted in corn and wheat, and the crops are a total loss.

Before noon of the 10th all railway service along the west side of the Mississippi River had been stopped by the washing out of bridges, etc., and heavy landslides from the bluffs overhanging the railway between Keokuk and Burlington also interfered greatly with railway traffic.

On the Iowa side of the Des Moines River the lands are not protected and were flooded from one-half to one mile inland. These lands were mostly planted in corn, but in the immediate vicinity of Keokuk a tract of several hundred acres, belonging to the Keokuk Canning Company, and planted in tomatoes and cucumbers, was a total loss. A small amount of stock was lost, principally in Clark County, Mo., and one man was drowned, the wagon in which he was driving being swept away by the current.

The rainfall observer at Mount Pleasant, Iowa, in the Skunk River watershed, reported 5.72 inches of rainfall on the morning of the 10th, and an additional 1.56 inches on the morning of the 11th, while Iowa City reported 3.98 inches on the morning of the 10th.

The Skunk River levee broke on the morning of the 11th, at a place known as the Matterson farm, one-half mile east of the bluff, and the damage in that district is estimated at $32,000.

The greatest damage in this vicinity, however, was caused by a small stream known as Lost Creek, a tributary of the Skunk River, whose flood waters caused a loss of $43,000 in growing crops.

Judging from the amount of precipitation over the tributary watersheds of the Mississippi River, it was expected that the Mississippi would rise slowly for at least 48 hours, but the highest point was reached at 2 p. m., June 10, after which hour the river fell steadily, falling below the danger line on the afternoon of June 12. On the 13th, the water had receded from all the overflowed lands. The very rapid rate of rise and fall showed conclusively that the heavy precipitation had been limited to a comparatively small area.

The conditions in the Hannibal district, immediately below, were not so serious, yet considerable damage was done to unprotected crops in the lowlands.

The following report of the high water was made by Mr. B. L. Waldron, Official in Charge of the U. S. Weather Bureau office at Hannibal, Mo.:

The Mississippi River was unusually high during the entire month of June, 1905, and, while only a sprinkle of rain fell at Hannibal until the 19th, the excessive rain of the 9–10th over southern and eastern Iowa, the northeastern corner of Missouri, and adjacent portions of Illinois, caused a flood to rush down the Mississippi with remarkable rapidity.

The river at Hannibal began to rise during the late afternoon of the 10th, at a stage of 11.3 feet, and reached a stage of 18.3 feet at 5 p. m. of the 12th, a rise of 7.0 feet in about 48 hours.

Flood warnings were issued at 3 p. m. of the 10th, forecasting a stage of nearly twenty feet by the 13th, and another on the morning of the 12th, stating that a stage of about nineteen feet would be reached, and that the decline would commence on the 13th. These warnings were timely and of great value; nothing movable was destroyed or damaged at Hannibal, Quincy, or other places that could be reached with the warnings.

There was a little seepage through the Sny levee. The new South River levee, protecting Bay Island, stood the flood well, except at the outlet gates, where much trouble was experienced. Constant work for two days was necessary to save the levee and the property that it protects.

All crops on unprotected lowlands were destroyed, and there are probably 6000 to 10,000 acres of such land under cultivation between Quincy, Ill., and Louisiana, Mo. Most of the business houses on Main street, Hannibal, were compelled to remove their goods from the cellars, and the railroads were put to some inconvenience, but no material loss occurred in this vicinity.

The river fell rapidly from the 13th to the 19th, inclusive, reaching a stage of 11.5 feet on the latter date. It then again began to rise steadily and by the 27th a stage of 14.8 feet was recorded. Flood warnings were issued on the 21st, forecasting a stage of fourteen to fifteen feet, and this forecast was repeated daily until the crest was reached.

At the end of the month the river was still above the danger line, with a stage of 14.4 feet. There was no damage done during the last rise, although it effectually prevented the replanting of the overflowed lowlands.

The flood in the Grand River of Michigan was remarkable for the time of its occurrence as well as for its serious character. Floods, worthy of the name, had hitherto been unknown during the summer months over this watershed, and a June flood was certainly most unexpected. The situation was almost as serious as during the great flood of March, 1904. At that time there was no river and flood service in existence in Michigan, and no warnings of the flood could be given. During the present flood the service was in full operation and by its excellent work did much to minimize the danger and damage. Much damage was done, but none that could have been prevented. The warnings were uniformly excellent, and were the subject of highest commendation from all concerned.

The following report on this flood was prepared by Mr. C. F. Schneider, Official in Charge of the U. S. Weather Bureau office at Grand Rapids, Mich.:

The June flood in the Grand River of Michigan was unprecedented. High water in this river is no unusual occurrence, but it usually occurs in the spring when the melting of the winter snow and ice and the frosty condition of the soil are important factors in causing it. Moderate summer floods have occurred in the past, due in part to log jams, but high water such as occurred this year has never been known before. In past years log jams have formed above Grand Rapids early in the summer, damming and holding back the water. With the breaking of the jam the waters were suddenly released, flooding the lower portions of the river. Owing to the decline of the lumber industry in this section of the State, such floods have not occurred in recent years.

The month of May marked a period of excessive rainfall throughout the lower portion of the State, the rainfall in the Grand River basin exceeding the normal by 2.36 inches. The first few days of June were moderately dry, although the soil remained thoroughly soaked with water. On the night of June 4–5 heavy rains of about one inch occurred in the western part of the State. At this time an area of low pressure was central over the upper Missouri Valley. During the 24-hour period ending June 6 the storm advanced eastward to the upper Mississippi Valley and caused excessively heavy showers over a large portion of the Lake region, the falls in southern Michigan being the heaviest. During the 36 hours ending Tuesday morning, June 6, an average of 5.13 inches of rain fell over the Grand River basin. The rains were torrential downpours that immediately congested the creeks and rivers tributary to the Grand and caused the river to rise from a moderately low stage on Monday evening to a moderately high stage on Tuesday morning, a period of 12 hours, and to stages above the danger line at all points 24 hours later, or Wednesday morning, June 7.

The following table of precipitation is of value in connection with this flood:

Precipitation at stations along the Grand, Cedar, Looking Glass, and Thornapple rivers during the month of May, with departures from the normal, and from June 1 to 6, inclusive.

Station.	River.	May.		June.						
		Amount.	Departure.	1	2	3	4	5	6	Total.
Jackson	Grand	6.12	+2.49	.03	T.	.24	.78	2.15	0.79	3.99
Fitchburg	*Cedar	6.37	+2.01	T.	0	0	.28	0.40	3.15	3.83
Webberville	*Cedar	4.36	.....	0	0	0	.10	1.13	4.76	5.99
Agricultural College	*Cedar	5.17	+1.95	0	0	0	.11	0.45	5.47	6.03
Lansing	Grand	5.51	+1.98	0	.01	0	.18	0.28	4.92	5.39
St. Johns	*Looking Glass.	5.46	+2.37	0	0	0	.04	2.18	3.90	6.12
Charlotte	*Thornapple	3.79	.....	.....	.....	.....	.....	.....	.....	3.50
Hastings	*Thornapple	6.60	+3.22	0	0	0	.68	0.50	3.60	4.78
Ionia	Grand	.....	.....	.....	.....	.....	.....	.....	.....	6.31
Grand Rapids	Grand	5.97	+2.49	0	.20	0	.36	1.20	3.56	5.32
Averages		5.48	+2.36	T.	.03	.03	.32	1.04	3.77	5.13

* Tributaries to the Grand.

The sudden rise which occurred during the night of June 5–6 and the reports of the heavy rainfall throughout the State prompted this office to at once put the river service into operation. Telegrams were immediately dispatched to all of the river observers, directing them to take and forward observations at once, and to continue sending reports at 7 a. m., noon, and 7 p. m. until further notice. From observations received at noon, June 6, it became evident that warnings were necessary and they were at once sent out to all places along the river, advising all interests that the river would rise above the danger line by Wednesday morning, and that a probable further rise would occur by Thursday morning. Further warnings were sent out on Wednesday and Thursday, June 7 and 8, and by Friday morning the river had reached the high-water mark of the flood, 18.1 feet, or 7.1 feet above the danger line, and only 2.3 feet below the highest water ever known at Grand

Rapids. Flood conditions prevailed until Thursday, June 15, by which time the river had fallen below the danger line.

The great value of the River and Flood Service was amply demonstrated during this flood and I believe it may be stated with perfect accuracy that hardly a dollar's worth of property was lost that could have been saved. On account of the accurate and timely warnings very many thousand dollar's worth of property was removed from basements, stores, and factories out of the reach of the high water, but a large amount of machinery and other property that could not be moved was considerably damaged, while the business of many factories was entirely suspended.

The floods in Colorado and New Mexico partook of the usual character of mountain floods and are thus described by Mr. F. H. Brandenburg, Official in Charge of the U. S. Weather Bureau office at Denver, Colo.:

During the first half of June high stages were general in all streams rising on the slopes of the Continental Divide in the central mountain region, where, owing to the cold spring, the melting of snow had not progressed gradually as usual.

The Arkansas remained high for an unusually long period. From the 2d to the 12th low bottom lands were overflowed, and considerable damage was done to farming lands in the vicinity of Canyon City and Florence. Railroads were put to considerable expense to protect their roadbeds between Pueblo and Salida.

The danger line on the Gunnison was reached at Grand Junction on the 12th, and the highest stage at midnight of June 5; this stage was four inches above the highest recorded in the last ten years. The stream fell below the danger line on the 6th, but rose nearly as high on the 9th, as a result of rains. Many bridges were washed away, and low-lying agricultural and fruit lands were considerably damaged.

A number of dams and reservoirs near the headwaters of the Grand were overtaxed and destroyed. The river was out of its banks between Rifle and New Castle.

In southwestern Colorado the Animas reached a stage equaling that reached in 1884, the highest known. Lowlands were overflowed, and two foot and five county bridges in Durango were washed away. The railroad between Durango and Telluride suffered interruption to traffic by the loss of bridges and the washing out of a large section of track along the Dolores River. The San Juan River, in southeastern Utah, was very high about the middle of the month.

In Arizona the lower Colorado was bank full at Yuma from the 12th to the 20th, and at flood stages from the 21st to the 28th, overflowing, and doing much damage to farms and crops. The river subsided rapidly after the 28th.

The streams of Wyoming carried large volumes, in some cases the largest in years, but no serious damage was done.

The disastrous flood in the Rio Grande which set in during the closing days of April, was at its maximum at different points in New Mexico on May 25 or 26, and reached the highest stage, 14.3 feet, at El Paso, Tex., on June 1.

Showers interrupted the steady and general decline that began with June, and from the 3d to the 12th destructive stages prevailed in northern New Mexico. While the resulting increase in volume in southern New Mexico was not great, it prolonged the flood stage by a week or ten days. At San Marcial the maximum stage during June, 12.7 feet, occurred on the 1st, and again on the 9th and 11th, after which there was a rapid decline; the danger line of 11 feet was passed on the 15th, 9.0 feet, on the 22d, and 8.0 feet at the close of the month. At El Paso on the 9th and 12th, the gage reading was 13.7 feet; on the 21st, 12.3 feet, a fall of one foot in four days, and at the close of the month an additional fall of 2.5 feet was noted.

Between Rincon and El Paso the railroad tracks were repeatedly washed away and large tracts of farming lands, both above and below El Paso, were cut off and carried away by the rapid current and the changing channel.

The following report of the flood in the Red River was made by Mr. J. W. Cronk, Official in Charge of the U. S. Weather Bureau office at Shreveport, La.:

Excessive rainfalls were frequent over the upper Red River watershed during April and May, and at Shreveport the rainfall for these two months was 19.62 inches. Flood stages naturally resulted and from the middle of May until the middle of June the Red River was continuously above the danger line over the greater portion of its course in Arkansas and Louisiana. Two crests were noted at Fulton, Ark., 28.9 feet on May 18, and 31.5 feet on June 1, 2, and 3. At Shreveport the river rose to the danger stage of 29 feet on May 26, and continued to rise slowly until the crest stage of 33.6 feet was reached on June 9. There was then a gradual fall to below the danger line on June 18.

Warnings were thoroughly disseminated well in advance of the flood to all interests in Red River Valley. The first warnings for the valley from Fulton to Shreveport were distributed by mail on May 13. On May 22, owing to further heavy rainfalls, a flood warning was distributed by telegraph in Arkansas and by mail in Louisiana, advising immediate removal of all families, stock, and perishable property to places of absolute safely. Further warnings and forecasts were issued as varying conditions for different localities required. The time and height of the crest stages were accurately forecast and were amply sufficient for the needs of all interested.

The losses from the effects of the floods in Arkansas and Louisiana were probably more than $100,000, the greater portion being attributable to the curtailment of cotton acreage on lands unprotected by State levees. The Texas and Pacific Railway from Shreveport, La., to Texarkana, Ark., also suffered severely, all train service being entirely abandoned for about one month. However, the total loss was comparatively small, as the value of property protected by State levees, and the value of stock and other movable property saved through the instrumentality of the Weather Bureau warnings has been conservatively estimated at more than $5,000,000. Individuals here and there were nearly ruined by the breaking up of farms, caving in of banks, and breaks in private levees, but no loss of life was reported.

The floods in the Ouachita and Arkansas rivers were not unusual in any respect and were forecast at the proper times. There was some trouble with weak levees in the Shreveport district of the Red River, but they were strengthened in time to prevent crevasses.

The highest and lowest water, mean stage, and monthly range at 283 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Divison.

The following summaries relating to the general weather and crop conditions during June are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon reports from cooperative observers and crop correspondents, of whom there are 3300 and 14,000, respectively:

Alabama.—Weather generally fairly favorable for growth and work; cultivation progressed steadily, except retarded by rain in northern, western, and some southern counties; rainfall deficient in central and eastern counties. Cotton improved slowly; mostly clean at close of month; plants small, but healthy, and fruiting satisfactorily. Corn and minor crops advanced well, except some deterioration where rainfall was deficient; some corn ruined by overflow in northern counties. Wheat and oat harvest completed; oats good yield, wheat light.—*F. P. Chaffee.*

Arizona.—Copious rainfall first decade; droughty conditions 12th to 30th. Temperature below normal. Grain harvest continued throughout month; yield fair; quality good; some damage from rust. Crop growth made good progress north. Fruit yielding largely in central and southern sections; drying extensive. Killing frost north section on the 16th injured fruit and vegetables slightly. Floods in the lower Colorado on the 21st to 28th washed farm lands and damaged crops. Third alfalfa cutting began on 28th. Water supply diminishing. Cattle and sheep in good condition.—*L. N. Jesunofsky.*

Arkansas.—The temperature was seasonable, with local showers in the first and second decades and general rains in the third. Cotton planting was practically completed; the crop made a good, healthy growth and was generally clean by the close of the month. Early corn suffered for moisture in the second decade, but improved during the third; the late planted came up to a fair stand. Oats were good and wheat poor. Apples dropped badly and a light crop was indicated; other fruits did well.—*Edward B. Richards.*

California.—Clear and cool weather prevailed throughout the State most of the month, and both temperature and rainfall were below normal. Thunderstorms in the northern sections and high winds in the San Francisco Bay district caused no material damage. Field fires in the San Joaquin Valley destroyed several thousand bushels of grain. Grasshop-

pers caused considerable damage to grain, alfalfa, and orchards. Crop growth was slow during the month, but grain harvest, haymaking, and fruit picking were progressing.—*G. H. Willson.*

Colorado.—Growth was rapid in north-central and eastern counties, but at close of month was retarded by droughty conditions in southern and western parts of State. Alfalfa harvest was in progress, with yield fair to good. Wheat, oats, rye, and barley made satisfactory advancement. Corn and potatoes were a good stand. Sugar beets did well; thinning out was well advanced, especially in western counties. Grasses were in fairly good condition, except in northwestern counties.—*F. H. Brandenburg.*

Florida.—The month had about normal temperature. There was a deficiency of more than two inches in rainfall. The first week was mostly dry, resulting in some damage to corn on uplands. The dry weather, however, was timely for cleaning cotton, which had become foul with grass. Rain was more frequent during the second and third decades. Late corn was benefited and a large acreage was set to sweet potatoes. Citrus trees were vigorous. The pineapple crop was short, but melons and cantaloups were abundant.—*A. J. Mitchell.*

Georgia.—The temperature was even and near normal. Very little rain fell the first half and farmers cleared the fields of grass; during the second half unevenly distributed showers occurred daily; cultivation was delayed and many fields became grassy. Cotton was generally healthy, though small, grew rapidly, and fruited well. Early corn seriously injured in many sections by drought, late varieties excellent. Oats good; wheat poor, damaged by rust. Peaches being shipped, yield variable, quality fine. Melons being marketed, large yield.—*J. B. Marbury.*

Hawaii.—Seasonable temperatures in most sections of the group, but rainfall below the normal in many leeward localities. Conditions on the whole, very favorable for growth of all cane, but some slight damage to young cane by high winds during second decade. Supply of surface water for irrigation decreased during month, necessitating resumption of pumping. Cane grinding for season nearing completion, and plantations busy planting and cultivating. Harvesting of summer pineapples general; yield heavy and of fine quality. Bulk of first rice crop in and yield generally satisfactory, although rather short in some sections. Coffee in good condition; some berries already ripening on lower lands in Kona, Hawaii. Pastures deteriorated considerably during month.—*Alex. McC. Ashley.*

Idaho:—Heaviest precipitation on record for June. Temperature lower than usual, with excessive cloudiness. Water supply continued better than was expected, but some streams were failing rapidly by the close of the month. An average hay crop was being secured as the month closed; range grass was excellent.—*Edward L. Wells.*

Illinois.—By the end of the first decade the bulk of the corn crop was in the ground, wheat was nearly ripe, barley, oats, and rye were doing well, and the mowing of clover had begun in the southern district. At the end of the month corn was in a thrifty condition, being mostly laid by in the central district, wheat harvest was well advanced, oats were turning ripe, and rye was in shock.—*Wm. G. Burns.*

Indiana.—Ground was too wet to work much of the time and the planting and cultivation of corn was greatly retarded. The crop was uneven, but generally clean and growing rapidly at the end of the month. Wheat, rye, oats, and grasses did well and the harvesting of wheat and clover was begun. Potatoes, melons, field onions, and gardens made good growth. Transplanting of tomatoes and tobacco was finished. Prospects for apples, peaches, and pears were fair, and for grapes good.—*W. T. Blythe.*

Iowa.—June was about normal in temperature, with an inch excess of rainfall, resulting in heavy growth of grain, grasses, and garden truck. Damage by excessive moisture was limited to lowlands and cultivated slopes in sections visited by heavy showers. At close of month corn was fairly well cultivated and nearly normal in size, spring wheat, oats, and barley were headed and filling well, and minor crops in normal condition. Apple crop declining.—*John R. Sage.*

Kansas.—Wheat harvest began the first week and thrashing began the third week, disclosing a fine berry and fair yield. The oat harvest began the third week. Corn clean, in fine condition, and grew rapidly. The first crop of alfalfa was cut by the 10th, and the second crop the fourth week, when prairie haying began. Apples were generally a fair crop.—*T. B. Jennings.*

Kentucky.—Dry first ten days; frequent showers middle and latter part of month. Wheat harvest completed, with interference by rain latter part of month; some grain damaged in shock. Oats ripening. Corn growing vigorously, but grassy in many places. Tobacco doing excellently, though cultivation was interrupted. Good gardens and potato crop. Berries abundant. Fruit doing well, with peaches beginning to ripen at close of month.—*F. J. Walz.*

Louisiana.—Although cultivation was pushed vigorously during the favorable weather of the first and second decades of the month, some parts of the cotton crop had not been cleaned, when rains during the third decade prevented further cultivation, and as a result were abandoned to grass and weeds; some crops along Red River were overflowed and the plant killed; a small amount of damage resulted from cotton boll weevil and bollworm; the crop was very irregular and fruiting poorly at close of month. Sugar cane made a healthy and substantial growth. The rice crop suffered at intervals from dry weather and then too much rain. Truck gardens matured heavy yields.—*I. M. Cline.*

Maryland and Delaware.—The temperature was normal, the precipitation was somewhat above normal; though not evenly distributed, rainfall was sufficient in all sections. Wheat developed finely and harvest was general at close of month. Oats headed very satisfactorily. Corn obtained a good stand and grew rapidly. Haying progressed during latter portion of month, with short crop. Cherries were an average crop. Tobacco stood well and was cultivated. Gardens yielded plenteously.—*E. D. Emigh.*

Michigan.—Very wet first of month, was generally favorable for wheat, rye, meadows, and pastures, but greatly interfered with all field work and with growth of corn, beans, and potatoes. Latter part of month was generally favorable to all crops and field work. Wheat, rye, and meadows continued unusually satisfactory, while oats, corn, and potatoes were in good condition at close of month. Late potatoes, beans, and considerable buckwheat were planted during last two decades and germinated well. Haying began about the 25th. Strawberries were plentiful, but cherries scarce.—*C. F. Schneider.*

Minnesota.—Very wet all the month. Lowlands flooded, and rivers rising rapidly at close of month. Spring wheat, oats, barley, flax, timothy, and clover growing rapidly on uplands. Rye and winter wheat heading about the 10th; early oats, barley, and timothy about the 20th; spring wheat about the 25th. Some red rust on spring wheat and oats late in month. Cultivation of corn, potatoes, and gardens delayed. Fine strawberry crop, but somewhat injured by rains.—*T. S. Outram.*

Mississippi.—Favorable weather prevailed during the first half of the month, when the working of crops progressed nicely, but during the latter half daily showers hindered cultivation. Cotton, although undersized and very grassy over much of the northern half of the State, generally made a good growth; blooms were noted by the close of the month. Early corn was much improved. Oat harvest was completed with good to excellent yields. Late corn, sugar cane, and gardens generally did well.—*W. S. Belden.*

Missouri.—Month favorable for cultivation and harvesting. Moisture lacking until last week, when rains were copious and general. Corn growing fast and being laid by in good order. Wheat, rye, and oats generally satisfactory, with yield and quality quite up to the average. Cotton made fast growth. Meadows were thin as a rule, but of good quality.—*George Reeder.*

Montana.—Cool and cloudy weather prevailed the greater portion of the month; the rainfall was above normal in nearly all sections. Potatoes and garden vegetables were injured locally by frost during the last decade. The month was highly favorable for wheat, oats, range, and meadows. Cattle and sheep made steady and rapid gains. Alfalfa haying commenced the last week. Some local damage to fruit by hail.—*R. F. Young.*

Nebraska.—Winter wheat ripened rapidly under favorable weather conditions. The harvest began in southeastern counties in the last week. Early oats headed well, but with short straw and rather thin stand; late oats were in much better condition. Grass in meadows and pastures was unusually good. Corn grew slowly and continued small and backward, but in good, healthy condition.—*G. A. Loveland.*

Nevada.—Temperature and precipitation were both below normal. Warm days and cool nights. Crops backward. Range feed fine; stock in excellent condition and improved rapidly in flesh. Haying progressed throughout the month, the yield being fair to good. Grain promising. Garden truck made slow growth. Irrigation water was not as plentiful as usual.—*J. H. Smith.*

New England.—The mean temperature of the month was below normal at nearly all stations. Frosts occurred in parts of all the New England States, except Rhode Island, generally on the 2d and 9th. The rainfall was decidedly in excess of the average for June, with plus departures at nearly all stations. Crops improved in all sections and were generally in a satisfactory condition. Little damage resulted from the frosts in the early part of the month.—*J. W. Smith.*

New Jersey.—The temperature and rainfall were nearly normal, but the latter was very unequally distributed. Rainy days were frequent, but the showers were light and insufficient for crop needs, especially in portions of the central and extreme southern sections, where truck crops were greatly shortened by drought. Wheat and rye were nearly ready to cut; heads well filled, straw short.—*Edward W. McGann.*

New Mexico.—Crops made rapid progress. Cultivation of corn began the second decade and harvest of wheat, rye, and oats the third decade, good yields being obtained. Alfalfa harvest continued during the month in higher districts and northern counties. Gardens did well, but insects and worms became destructive, damaging also alfalfa, field peas, and beans. Fruit conditions were good and early fruits abundant. Range grasses were excellent and stock advanced to prime condition, although a slight drying out occurred on the ranges toward close of the month.—*Charles E. Linney.*

New York.—The first half of the month was too cool for growing crops. From the 15th to the 21st was warm, with abundant rain, causing great improvement in all crops. The last week was quite cool. Wheat, rye, and oats did well. Grass in meadows and pastures improved. Apples

SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS, JUNE, 1905.

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	79.0	+ 1.0	Thomasville	102	12	Anniston	49	2	4.56	+0.21	Thomasville	10.70	Burkville	1.35
						Valley Head	49	3						
Arizona	76.9	— 2.1	Aztec	118	25	Flagstaff	30	16	0.50	+0.27	Huachuca Reservoir	3.61	11 stations	0.00
						Taylor	30	1						
Arkansas	77.9	+ 1.6	Brinkley	104	17	Batesville	44	1	5.90	+2.01	Arkadelphia	21.55	Oregon	1.28
			Russellville	104	15									
California	67.5	— 2.4	Imperial	116	11	Bodie	16	5	0.07	—0.21	Bowmans Dam	1.72	Many of stations	0.00
			Volcano Springs	116	22									
Colorado	62.3	+ 0.8	Las Animas	104	27	Lay	23	6	0.98	—0.58	Burlington	4.69	Grand Junction	0.04
			Lamar	104	27, 28	Whitepine	23	10						
						Antelope Springs	23	6, 10						
Florida	80.2	+ 0.4	Orange City	101	8	Middleburg	48	6	4.96	—2.18	Orange Home	14.86	Pensacola	0.93
Georgia	78.7	+ 0.8	St. Marys	103	26	Clayton	44	10	3.69	—0.97	Monticello	8.18	Point Peter	1.09
Hawaii	†73.0		Kihei, Maui	92	4, 8	Humuula, Hawaii	31	16	‡4.46		Nahiku, Maui	26.53	Kihei, Maui	T.
			Waianae, Oahu	92	15									
Idaho	59.1		Payette	96	22	Forney	25	16	1.95		Fernwood	5.62	Malad	0.20
Illinois	72.6	+ 0.7	Chester	104	5	4 stations	38	3	3.39	—0.63	La Harpe	12.60	Tilden	0.26
Indiana	71.7	— 0.1	Salem	102	19	South Bend	41	27	3.61	—0.63	Washington	7.30	Franklin	0.93
						Winamac	41	8						
Iowa	69.9	— 0.3	Red Oak	100	9	Washta	36	22	5.53	+1.00	Keosauqua	14.89	Forest City	1.80
Kansas	75.5	+ 2.5	Medicine Lodge	108	18	Achilles	42	7	3.96	—0.48	Salina	13.64	Hugoton	0.57
						Colby	42	6						
Kentucky	74.8	+ 0.7	Owenton	106	18	Manchester, Shelby City.	45	1	4.49	+0.49	Frankfort	7.65	Beaverdam	1.04
						West Liberty	45	9						
Louisiana	81.1	+ 1.5	Reserve	102	4 dates	Calhoun, Opelousas	60	2	7.22	+2.13	Lafayette	18.52	Shreveport	2.64
Maryland and Delaware	71.2	0.0	Boettcherville, Md.	102	19	Deer Park, Md	25	9	4.44	+0.55	Annapolis, Md	7.61	Boettcherville, Md.	1.80
Michigan	63.2	— 0.8	Owosso	100	17	Wetmore	24	22	4.46	+1.37	Mackinac Island	8.60	Gladwin	1.30
Minnesota	63.0	— 1.8	New Ulm, St. Peter	95	5	Luverne	31	1	6.41	+2.39	Long Prairie	9.89	Winnebago	2.42
Mississippi	79.5	+ 0.7	Columbus	102	11	Duck Hill	50	2	4.95	+0.13	Corinth	9.75	Hattiesburg	1.80
			Magnolia	102	17									
Missouri	75.2	+ 2.1	Versailles	103	17	Ironton	42	1	3.09	—1.73	Macon	6.88	Glasgow	0.74
Montana	56.8	— 2.3	Billings	94	27	Wolsey	23	18	3.40	+0.82	St. Peter	7.86	Alzada	1.12
			Forsythe	94	28									
Nebraska	68.4	— 0.5	Dawson	99	9	Kennedy	37	22	5.04	+1.24	Holdrege	11.83	2 stations	1.70
Nevada	62.0	— 1.7	Pioche	101	30	Battle Mountain	22	2	0.11	—0.38	San Jacinto	1.48	10 stations	0.00
New England*	62.3	— 2.9	Oquossoc, Me	95	16	Patten, Me	26	7	4.54	—1.35	Middleboro, Mass	7.26	Houlton, Me	1.50
New Jersey	68.3	— 1.4	3 stations	96	19	Charlotteburg	35	4	3.43	—0.10	Woodstown	8.71	Cape May C. H	1.67
New Mexico	69.7	+ 0.5	San Marcial	110	28	Elizabethtown	28	6, 17	1.53	+0.09	Salado	4.37	Luna	0.05
						Winsor	28	18						
New York	64.3	— 1.1	Elmira	95	19	Paul Smiths	22	1	5.49	+1.62	Blue Mountain Lake	11.59	Youngstown	2.22
North Carolina	74.6	+ 0.3	4 stations	99	3 dates	Buck Springs	30	10	3.15	—1.35	Horse Cove	9.55	Manteo	0.20
North Dakota	59.7	— 3.5	New England	97	3	3 stations	32	20, 21	4.52	+0.68	Oakdale	8.17	Fort Yates	2.38
Ohio	69.2	— 1.9	Bladensburg	99	18	3 stations	34	3	4.72	+0.75	Benton Ridge	9.27	Greenville	1.82
Oklahoma and Indian Territories.	78.5	+ 1.8	Alva, Okla	106	28	Fairland, Ind. T	52	1	1.88	—1.43	Fairland, Ind. T	7.38	Grand, Okla	0.58
Oregon	59.4	— 0.4	Blalock, Umatilla	96	10	Silver Lake	23	29	1.62	+0.18	Government Camp	3.74	Buckhorn Farm	0.13
Pennsylvania	68.0	— 0.4	Hanover	99	19	Pocono Lake	30	4	4.39	+0.23	Somerset	8.35	Philadelphia	1.77
Porto Rico	78.4		Manati	99	3 dates	Adjuntas	55	4, 26	5.00		Las Marias	12.43	Cidra	1.07
						Cidra	55	9						
South Carolina	78.9	+ 0.9	Yorkville	101	22	Scivern	43	10	1.92	—3.28	Walhalla	6.30	Little Mountain	0.17
South Dakota	64.4	— 2.3	Armour	103	13	Brookings	33	22	5.78	+2.40	Forestburg	10.91	On the Trees Camp	2.56
Tennessee	75.7	+ 0.9	Pope	100	18	Erasmus	40	2	5.94	+1.62	Jackson	12.09	McGhee	2.40
Texas	80.5	+ 0.4	Big Springs	107	15	Texline	45	1	4.64	+1.32	Jefferson	15.33	Tulia	0.11
Utah	64.7	— 0.3	Grayson	110	22	Beaver	23	5	0.18	—0.18	Meadowville	1.15	20 stations	0.00
Virginia	72.2	— 0.2	Arvonia	101	19	Blacksburg	33	30	3.87	—0.11	Charlottesville	8.60	Danville	1.03
Washington	60.3	— 0.3	Hatton	101	20	Cheney	27	14	2.75	+1.35	Ashford	5.38	2 stations	0.99
West Virginia	70.6	— 0.2	Valley Fork	100	19	Bayard	34	4	4.38	—0.44	Terra Alta	7.72	Weston	1.74
Wisconsin	64.1	— 1.2	Prairie du Chien	98	4	Butternut, Prentice	32	27	7.00	+3.20	Meadford	16.20	Madison	2.88
Wyoming	56.5	— 1.8	Fort Laramie	97	27	Border	21	6	1.99	+0.52	Cambria	5.21	Green River	0.15

*Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. †49 stations, with an average elevation of 667 feet. ‡128 stations.

deteriorated, but other fruits did well. Potatoes did well, but corn was backward. Tobacco was transplanted and started well. Farm work was delayed by rain, but at the end of the month was fairly well advanced.—*H. B. Hersey.*

North Carolina.—Excepting cool periods about the 2d and 10th, the temperature during June was favorable for the growth of crops, especially during the last decade, which was very warm. The precipitation was below normal, giving farmers opportunity to cultivate crops. Cotton improved steadily in appearance and growth, it branched well, squares formed freely, and blooms appeared by the end of June; lice were injurious in many counties. The progress of corn was not so favorable. Tobacco grew fairly well and a little was cut and cured. Wheat and other small grains were successfully harvested, but the yields were not large. Minor crops did well.—*C. F. von Herrmann.*

North Dakota.—The month was generally cool and cloudy, with heavier rainfall than usual, and very favorable for most crops, except corn and flax. Some of the lowlands in the eastern and northern parts of the State were flooded by heavy rains and crops growing there were considerably damaged. Planting and seeding of all grain were practically finished at the close of the month.—*B. H. Bronson.*

Ohio.—Wet weather retarded the growth of crops during the fore part of the month. Much replanting of corn was necessary. Wheat was ripening nicely at the end of the month. Some damage by the weevil and rust was reported. Garden crops good. Tobacco mostly transplanted and growing well. A large hay crop. Some potatoes rotting in ground and some blighting, but damage not serious.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The driest June on record, with the exception of June, 1894. The temperature was slightly above normal. Wheat, oats, rye, barley, potatoes, hay, fruit, and berries were harvested or being secured, with poor to good yields. Corn was laid by, and silked, tasseled, and eared out well. Cotton was chopped to a fair stand, with early squaring, blooming, and fruiting well; some damaged by web worms. Minor crops did well.—*C. M. Strong.*

Oregon.—Fall wheat, barley, and rye headed and filled nicely. Spring wheat made good advancement and it began to head during the third decade. Spring oats made rather poor growth, owing to prevalence of

red rust. Alfalfa, vetch, and clover yields were generally above the average, and pasturage continued good. Potatoes and gardens made splendid progress, but hops did poorly, owing to the yards being badly infested with lice. The yield of strawberries and cherries was below average.—*Edward A. Beals.*

Pennsylvania.—At the close of the month considerable hay and some wheat and rye were secured. Oats were heading rapidly and a good crop was promised. Practically all crops were well advanced. Corn, tobacco, vegetables, and pastures were in prosperous condition and garden truck and small fruits were plentiful. Apples were of excellent quality, but scarce and dropping badly. Buckwheat seeding and cultivation were progressing satisfactorily and the transplanting of tobacco plants was practically completed.—*T. F. Townsend.*

Porto Rico.—Weather favorable for growth until the last week, when it became too dry. Cane grinding nearly finished; crop generally excellent, although below normal in a few wet districts. Cane planting continued; young canes did well. Coffee maturing and a small amount picked; the berries fell badly in a few districts on account of dry weather. Corn, beans, and other small crops were harvested and planted. Mangoes and pineapples were abundant; a few alligator pears marketed. The cotton crop was badly damaged by worms in some places.—*E. C. Thompson.*

South Carolina.—Temperatures were favorable. Deficiency in precipitation gave opportunity to clean field crops of grass and weeds and give them much needed cultivation, but the long, dry spell and previous lack of cultivation had injured early corn irretrievably. Cotton improved steadily; blooms were noted during the last decade. Wheat and oat harvest was finished. The weather was unfavorable for the best development of tobacco. Early peaches were plentiful and of good quality. Minor crops needed more moisture.—*J. W. Bauer.*

South Dakota.—Month cooler than usual, with much cloudiness. Excessive rainfall over much of the State, injuring crops on lowlands. Spring wheat, oats, barley, spelt, winter and spring rye, potatoes, and flax did well, except on lowlands, though red rust appeared in considerable wheat and in some oats in the third decade. Corn was backward and cool weather and frequent rains retarded growth and cultivation. Grass was in excellent condition. By the 25th barley, spring rye, and early oats were heading and early spring wheat was beginning to head. Local damage from hail.—*S. W. Glenn.*

Tennessee.—The first ten days of the month were very favorable for farm work, which was pushed vigorously, but the cool nights were unfavorable to cotton and young corn. Rainy weather from the 12th to 30th greatly hindered cultivation and harvesting, and much grain and hay were badly damaged. The yield of oats and hay was very good, but of wheat only fair. At the end of June all crops were growing rapidly, cotton and tobacco being overgrown in many fields, and all were very much in need of cultivation. Apples and peaches were scarce and inferior.—*H. C. Bate.*

Texas.—Temperatures generally averaged above normal, but were slightly below in the southwestern district. The weather was generally favorable for crops and farm work early in the month, but showery weather later delayed work and caused some damage to grain in shock. Cotton improved decidedly early in month, but later weather was less favorable, and caused increased activity of boll weevils. Some cotton picked in extreme south by end of month. Corn improved rapidly during latter part of month. Other crops fair to good.—*M. E. Blystone.*

Utah.—The temperature was about normal. Precipitation was deficient and none was reported over portions of the southern counties. Irrigated crops were in good condition, but arid land crops deteriorated considerably. Fall and early sown spring wheat were being harvested, also the second crop of alfalfa. Insects were reported in some sections. Beets were in fine condition and gardens were doing well. Ranges deteriorated, but stock was still thriving.—*R. J. Hyatt.*

Virginia.—Cool weather prevailed over the State, with variable and poorly distributed amounts of precipitation, until the 14th. These conditions were unfavorable for crop progress, especially spring plantings. After the 15th warmer weather, with ample rainfall, prevailed and there was a general improvement in the condition of vegetation. Harvest of wheat and oats began in the month and haymaking also was undertaken, but this and other field work was interrupted considerably by frequent rains.—*Edward A. Evans.*

Washington.—The western division had nearly normal conditions, but in the eastern division there was an unusual amount of rain, the greatest amount on record in some of the central counties. The result was very beneficial for nearly all crops, especially for pastures, meadows, potatoes, oats, barley, and wheat. Winter wheat grew very rank and some was lodged by wind and rain.—*G. N. Salisbury.*

West Virginia.—Conditions were generally favorable for growth, but cultivation was retarded during the first and fourth weeks by wet weather. The third week was clear and hot and especially favorable for the rapid growth of corn. At the close of the month clover and wheat harvest was in progress, oats, gardens, millet, and sweet and Irish potatoes were doing well, and meadows and pastures were improving.—*E. C. Vose.*

Wisconsin.—The month was notable for severe local storms, excessive rainfall, and deficiency of sunshine and temperature. The storm that passed over the State on the 3d to 6th resulted in almost unprecedented rains in the central and northwestern counties, flooding lowlands and causing much damage to crops along the streams. Bridges were washed away in many places and traffic delayed. Growing crops made satisfactory progress during the month, except on lowlands, where excessive moisture interfered with growth.—*W. M. Wilson.*

Wyoming.—The heavy rainfall over the northern and eastern counties rendered irrigation unnecessary over many sections, and the streams of the State gave plenty of water for irrigation where necessary. Gardens were backward, but grain made good progress. The harvest of the first crop of alfalfa was in progress at the close of the month, and a good crop was being secured. Native meadows made good growth. Ranges continued to improve, and all stock were in excellent condition.—*W. S. Palmer.*

SPECIAL ARTICLES.

TORNADO OF JUNE 5, 1905, AT BINGHAMTON, N. Y.

By W. E. DONALDSON, Observer.

This elaborate paper contains many details of local interest and is fully illustrated by charts and photographs, for which, however, space could not be afforded here. The following paragraphs will indicate the scope of the paper, and suffice for the meteorologist.—ED.

A small, local, very violent storm passed over Binghamton, N. Y., about 10:30 p. m., of June 5, 1905. The weather during the day was moderately warm, with a maximum temperature of 79°. A thunderstorm with feeble thunder and lightning and light rain occurred during the afternoon. The isobars for 8 p. m., June 5 are shown in fig. 1.

Heavy rain accompanied by frequent and extremely vivid lightning and strong gusts of wind commenced about 9:22 p. m., and continued until 10:30 p. m., when a confused rumbling roar was heard for a short time, after which comparative silence ensued. The roar is presumed to have been caused by a violent whirlwind, moving at a rate of 45 or 50 miles per hour.

The storm first struck Binghamton at the Westcott place at the extreme southwestern limit of the city within a few hundred feet of the left bank of the Susquehanna River. Here the whirlwind demolished three barns, damaged several houses and barns, and uprooted a number of large trees.

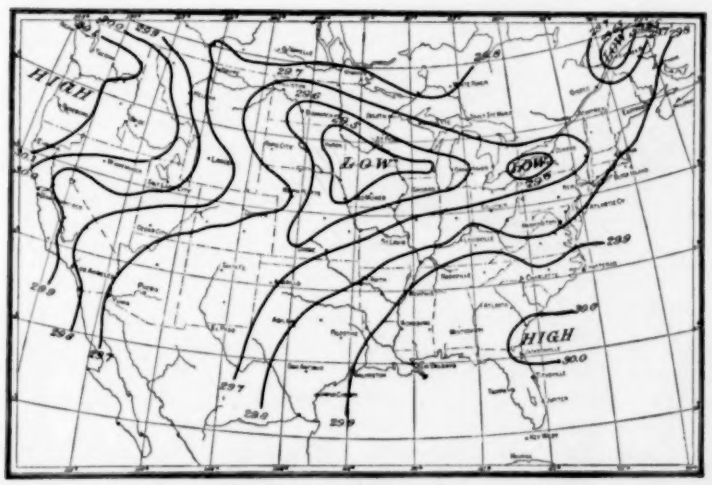

FIG. 1.—Isobars for 8 p. m., June 5, 1905.

Crossing the river the whirlwind struck a field of rye near the track of the Binghamton Driving Park. From this point it followed a path extending over the low flood plain on the right bank of the river and probably a portion of the river within a few hundred feet of the right bank, the width of the track over the flood plain being from 170 to 400 feet. Here the storm uprooted and broke off many trees ranging

from two inches to two feet in diameter. From the driving park to Chapin street the whirlwind passed over a section practically uninhabited.

From Chapin street to Front street the whirlwind covered only a narrow strip on the right bank of the river. Several houses near the river bank were slightly damaged, and many trees were broken off.

At Front street the whirlwind crossed the river again and passed over the Withington place a hundred feet south of the left bank, uprooting and breaking off a number of large trees ranging from six inches to two and one-half feet in diameter.

After passing the Withington place the tornado left the narrow flood plain on the left river bank, ascended a gentle slope, and suddenly began to do serious damage; four houses and one barn were more or less demolished, three houses were unroofed, four were badly shifted on their foundations and a number were slightly damaged, and many trees uprooted.

From Mill street to Telegraph street the whirlwind ascended a rather steep slope, uprooting many trees and doing the damage described in the preceding paragraph. A few hundred feet from Kress street it passed over the only hill in its track within the limits of Binghamton, the summit of the hill being 150 feet above the street and 300 yards distant. Not the slightest damage was done to the small trees covering the west side and summit of this hill, but about halfway down the eastern side of the hill the storm passed over a vacant house, known as the Eaton place; this house was completely wrecked and the débris carried to a considerable distance toward the northeast.

From the Westcott place to the Withington place the whirlwind followed the river, passing over a water surface and a nearly uninhabited land surface. After passing the Withington place the storm passed over a comparatively thickly settled territory. With the few exceptions, noted above, the damage done by the whirlwind over a path from 170 to 600 feet wide and about one and one-third miles in length, from the Withington place to the Eaton place, where it passed beyond the city limits, consisted of shade trees uprooted, houses slightly disturbed on their foundations, chimneys blown down, and walls and roofs damaged by flying débris. More than half of the houses that were in the path of the storm escaped without the slightest damage and less than 15 per cent of the trees in the path were damaged.

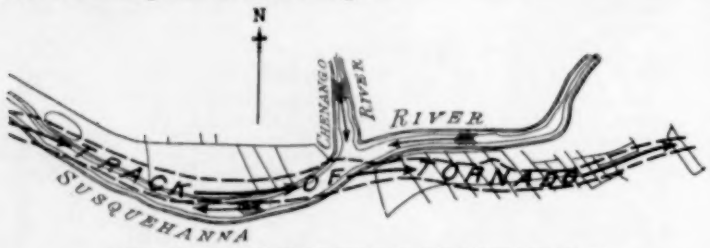

FIG. 2.—Track of tornado in Binghamton, N. Y.

Although intense darkness prevented direct observation of a funnel-shaped cloud, the characteristics developed indicate that the storm was tornadic. It passed over a path 170 to 600 feet in width and about two and seven-tenth miles long (see fig. 2). Its destructive force was spent in the middle of its narrow path and diminished laterally so rapidly as to leave houses and trees uninjured at a distance of 60 feet to the right and left of houses that were shattered. At the Eaton place the storm passed over a hill, leaving undisturbed the trees that covered the summit, descended 80 feet and completely wrecked a house that would have been completely protected by the hill had the storm been a straight blow. The general direction in which trees and débris lay in the center line of greatest destruction further confirms the opinion that this storm was a tornado.

Notwithstanding its destructive violence not a person was seriously injured by the storm. The total damage to property in Binghamton is estimated at $15,000.

A NOVEL TYPE OF RECORD SHEET ADAPTED TO SEISMOGRAPHS, AERIAL METEOROGRAPHS, ETC.

By CHARLES F. MARVIN, Professor of Meteorology, U. S. Weather Bureau.

Many difficulties are encountered in securing records from the automatic instruments sent up on kites and balloons. This is especially the case with sounding balloons which often reach very great elevations and enter strata, the temperature of which is many degrees below zero. Temperatures more than 100° Fahrenheit below zero have been observed. Inks are almost certain to fail by freezing or thickening, and, in addition, are likely to be much affected by conditions of extreme moisture or rain, as, for example, when the instrument is carried through clouds or exposed to rainfall. After the balloon and instruments return to the earth, many days, even weeks, elapse sometimes before they are discovered, during which time the precious record is constantly liable to obliteration and destruction.

In one of the best methods of registration thus far employed the surface of the record sheet is covered with a coating of soot deposited by a smoky flame. Thin aluminum foil, or similar metal sheets, are far more durable and moisture proof than paper and are generally employed. Such recording surfaces offer exceedingly slight resistance to the stylus of the recording pen, and are unaffected by cold, moisture, etc., but a serious difficulty is presented in the facility with which the records may be obliterated and the smoked surface destroyed by accident or inadvertence in handling before the records are finally secured and varnished so as to render them permanent.

A novel modification of this method of registration has been recently devised by Mr. R. Nimführ, the assistant in the Central Institution for Meteorology and Geodynamics, of Austria. A short account of this was presented by Dr. J. M. Pernter at a meeting of the Mathematical Section of the Imperial Academy of Science in May, 1905, and the following is a translation of his paper:

A NEW METHOD OF FIXING THE RECORDS FROM SOUNDING BALLOONS, AND A NEW DEVICE TO AUTOMATICALLY DISENGAGE THE RECORDING PENS AFTER LANDING.

Heretofore smoked glazed paper or aluminum foil has commonly been employed for meteorograph records of sounding balloons. The soot coating is fixed or rendered permanent at the end of the journey by dipping the record cylinder in a solution of shellac.[1] This mechanical fixing of records of the registration apparatus is nevertheless accompanied with many disagreeable consequences. In the first place the original curves by the mere act of measuring are scratched and obliterated in the most undesirable manner. Again, it not infrequently happens that by an accidental touch of the cylinder before fixing, the record is effaced and can not possibly be reproduced.

I have now succeeded in finding a new method for fixing the records that is not open to the defects mentioned, and in addition has several advantages over the usual methods of fixing the soot coating.

I place upon the record cylinder common photographic printing paper (celluloid paper) and smoke the same in feeble daylight in the usual way. When the apparatus returns to the central station after the ascension, the cylinder is removed, exposed to light, and the coating of soot removed by means of a cloth; the paper is now removed and washed and handled

[1] A very superior varnish for fixing record sheets of this character has been extensively employed at the Weather Bureau for varnishing records from the Bosch-Omori seismograph. This consists of a solution of about 15 grams of celluloid in 100 cubic centimeters of acetone which is subsequently diluted with about 400 cubic centimeters of amyl acetate. Alcohol may be used as the solvent as well as acetone. From 24 to 48 hours, with frequent shaking, are required to thoroughly digest the celluloid and reduce it to a homogeneous, viscous liquid. Large record sheets of paper may easily be varnished on the face only or both front and back as desired. For this purpose the varnish is placed in a small shallow tray. The sheet is held at each end in a deep J-formed loop and the surface touched carefully to and drawn over the varnish and laid out flat to dry, or better, dried by gentle heat from a steam radiator or small gas heater.—*C. F. M.*

as in making photographic prints. After fixing and washing the records appear as brilliant, brownish-black lines on a white ground. The curves are of exceptional fineness.

At the last international ascension on April 5, 1905, from the Central Institution for Meteorology and Geodynamics of Austria, located on the Hohewarte, near Vienna, a test was made simultaneously of the above-described new fixing method and a new device constructed by me for automatically lifting the recording pen after the landing.

The principle upon which my automatic engaging and disengaging arrangement is based is briefly as follows: As long as the protecting case in which the registering apparatus is installed rests upon the ground, the marking pens are lifted from the cylinder, but when the basket is lifted from the ground by the balloon, its weight stretches a spiral spring. This turns the disengaging lever upon its axis and permits the recording pens to touch the drum in a writing position. So long as the apparatus remains floating in the atmosphere, that is to say, throughout the whole duration of the ascension, the spiral spring is held in this strained condition. The recording pens rest, therefore, upon the drum and trace the record. But at the moment when on landing the basket again rests upon the ground, the pull exerted by the supporting balloon is withdrawn from the line joining the balloon and basket, thereupon the force of the spiral spring again comes into action and turns the disengaging lever back again to the position of rest, whereby the writing pens are lifted from the drum and remain lifted. Heretofore a scratching and partial obliteration of the original curves was inevitable because the pens continued writing for many hours after landing, and through the unavoidable movement of the pen levers backward and forward in consequence of agitation during transportation. The exact evaluation of the curves is made extremely difficult on this account. By using my automatic device the scratching of the original trace, or the obliteration of the zero line, is practically impossible, since the writing pens rest on the recording drum only while the apparatus floats in the air.

In addition to the advantages thus mentioned which the automatic device possesses over the usual method heretofore followed, the manipulation of the registration apparatus before the ascension is essentially reduced and simplified by its use as we shall briefly set forth. Heretofore it was necessary immediately before the ascension to adjust the time lines and arrange the zero line of the pen levers. Not until then could the apparatus be placed in the basket and secured therein. This whole procedure requires about fifteen to twenty minutes of time, and, especially in winter or rainy weather, is often decidedly unpleasant, as naturally most of the work must be done in the open air. A further objecton to the old method is that the pens remain in a writing position during the whole time that elapses between the preparation of the apparatus and the liberation of the balloon, and, by the unavoidable jarring of the apparatus, the soot coating of the recording drum is badly scratched. All of these disadvantages are wholly avoided by employing the automatic engaging and disengaging device. The meteorograph can be fully installed and secured in the basket the day before, or still earlier, and nothing remains to be done before the ascension but to wind the clock-work by means of a special key. Since the writing pens begin to write only at the moment the basket swings free in the air, therefore, the beginning of the registration and the zero line for the reduction of the curves start off simultaneously.

The curves obtained in the international balloon ascents during April and May, 1905, as produced by the new photographic method and with the automatic pen lifter, were laid before the academy.

There is undoubtedly much merit in both these developments by Mr. Nimführ, and the writer was at once led to employ the new photographic method in a different way from that mentioned by Doctor Pernter, namely: To make seismic records by it from instruments adapted to mechanical registration. Even ordinary blueprint (ferro-prussiate) paper is found to produce very clear records by this method, in fact the only objection which might be urged against the use of the large-sized record sheets required with the seismograph and such instruments is the item of cost for the paper and the trouble in toning and fixing the photographic prints.

There is a kind of record sheet still different from any of these that is especially appropriate for the kite and balloon meteorographs and where ink records can not be used for one reason or another. The method however requires the use of glass or celluloid or metal foil sheets. Instead of coating the sheet with soot a uniform coating of black printer's ink is applied by means of the usual hand roller. With a few simple facilities for the purpose an exceptionally fine writing surface can be produced. The record is traced on this surface in the usual way by means of a fine, smooth-pointed stylus. After 24 hours, more or less, according to the quality of ink used and the amount applied, the sheet and its record will dry hard and firm. If desired, the drying of the record may be hastened by a gentle heat carefully applied. The writer has not had an opportunity to actually test this manner of securing records, but it does not appear to present any serious difficulties; ink coatings on glass have been tried in connection with certain engraving processes with very promising results.

OBSERVATIONS OF ATMOSPHERIC ELECTRICITY AFTER THE ERUPTION OF MOUNT PELÉE, MAY 8, 1902.

By Prof. ARTHUR W. WRIGHT. Dated New Haven, Conn., June 22, 1905.

During the recent visit of Prof. Cleveland Abbe to the Sloane Physical Laboratory certain observations of atmospheric electricity, which had been made here just after the great eruption of Mount Pelée, were referred to in a conversation with him by the writer, and at his request the following account is communicated:

This laboratory was one of the stations established in 1884, under the direction of the Chief Signal Officer, for the study of atmospheric electricity, and systematic observations were carried on for nearly two years by Mr. O. L. Fassig, the observer detailed for this work. After the suspension of operations on the part of the Government observer, the work was continued in the laboratory, and since then the observation of atmospheric electricity has been one of the regular exercises of the physical laboratory, and, with few exceptions, each student makes the observation in the ordinary course of his laboratory work. This part of the electrical work is usually taken up during the months of April, May, and June. In consequence of this arrangement it resulted that in the laboratory exercises of May 8 and May 9, 1902, observations of the electrical condition of the atmosphere were made by students assigned to the work, and the records preserved in their note books, with curves showing the course of the changes in the atmospheric potential during the period of the exercise.

The curves thus obtained are reproduced in figs. 1 and 2. The actual time of the observations was between the hours of 10 and 11 a. m., the measurements beginning at the former hour, approximately, and continuing at intervals of three minutes for the time indicated in the figures. Other work in the measurement of potential, with the quadrant electrometer, ordinarily precedes the observation of atmospheric potential, so that the time given to the latter is limited somewhat and varies from one occasion to another.

Fig. 1 represents the observations of May 8, 1902, as made by Mr. Frank J. Sladen and Mr. Norman C. Thorne, of the class of 1902. The curve does not show very marked deviation from the normal or the average of those generally obtained here, except that the changes are somewhat more rapid and abrupt than is usual.

The curve reproduced in fig. 2 was drawn by Mr. W. W. Duncan, of the same class, from his observations made on the morning of May 9, 1902, the day following the eruption of Mount Pelée. It is remarkable in several particulars, but especially for the fact that it indicates a considerable negative potential for the greater part of the period of observation. This is more remarkable, as on that day the weather was fine and clear. Mr. Duncan's note upon this is to the effect that it "was a bright, clear day, with no signs at all of thunderstorms or electrical disturbances." In this respect the observation is unique among those made here during the past twenty years, as during all this time the atmosphere has uniformly shown a positive charge in fair weather, except perhaps a mere momentary dipping below the zero line in a few instances. Strong and sustained negative potential has never been observed here, except on occasions of heavy rain or snowfall. The result obtained on May 9 was so striking and unusual that several observations were made later in the day. The potential remained strongly negative during most of the

afternoon, though apparently diminishing slowly. The next day it was found to be positive again and did not depart from the normal conditions. Another peculiarity of the record of May 9 is the vacillating character of the charge observed, the larger excursions of the curve having superposed upon them a number of small and rather rapid fluctuations, whereas, in general, the variation of potential occurs gradually and rather slowly.

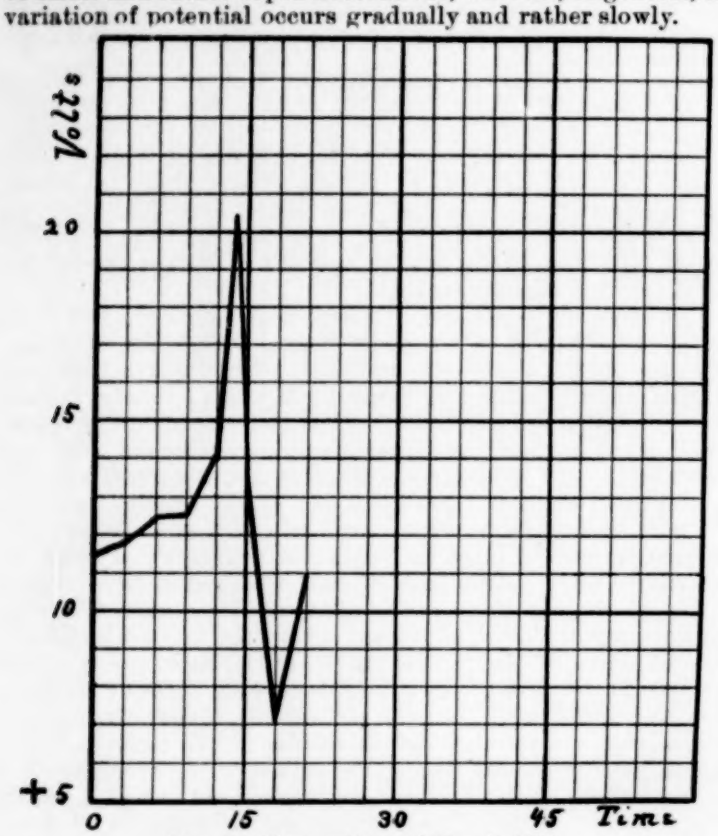

FIG. 1.—Observations of May 8, 1902.

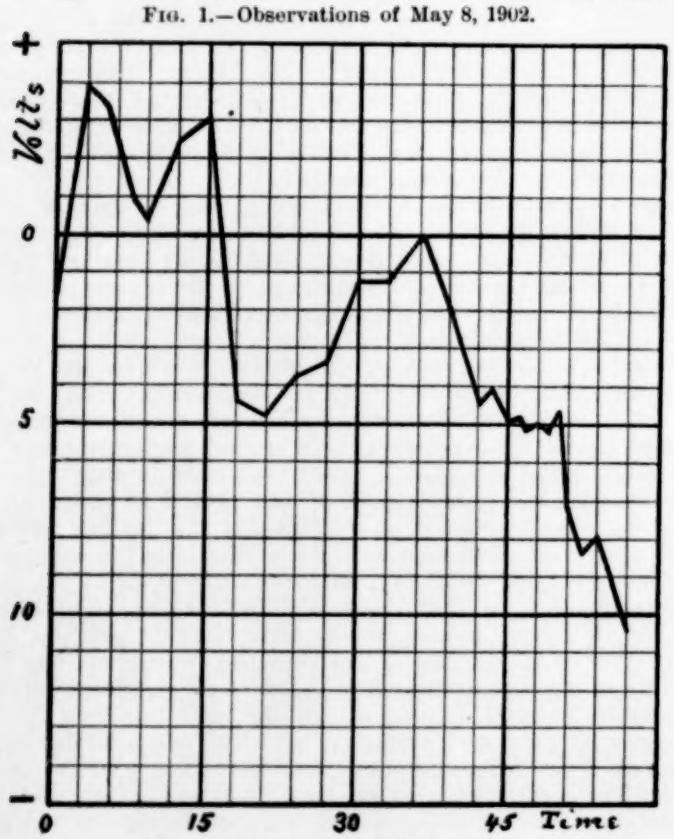

FIG. 2.—Observations of May 9, 1902.

These results appear to indicate an abnormal electrical condition of the atmosphere, and the influence of some energetic disturbing agency. It seems not at all improbable that the immense volumes of gases and other eruptive products ejected from the crater of the volcano, and which were manifestly the seat of intense electrical charges, may have made their influence felt, gradually and progressively, at great distances from their point of origin, and so have produced a widespread disturbance of the electrical condition of the atmosphere. This would naturally accord with the absence of any immediate and radical departure from the normal in the observation of May 8, made within about two hours after the great eruption, the minor peculiarities observed being such as might be due simply to inductive effects at a distance.

IMPROVED METHODS FOR FINDING ALTITUDE AND AZIMUTH, GEOGRAPHICAL POSITION, AND THE VARIATION OF THE COMPASS.

According to St. Hilaire's method, having found the altitude and azimuth of a celestial body for an estimated geographical position of the ship, a navigator can at once obtain a Sumner line or locus of position. He simply draws a line through the estimated position on the chart in the direction of the azimuth or true bearing of the body and lays off along this line of bearing an intercept from the estimated position equal to the difference between the altitude as deduced from instrumental measurement and the altitude that the observed body would have if the observer stood in the estimated geographical position. This intercept is drawn toward the direction of the observed body or away from it, according as the measured altitude is higher or lower than the altitude due to the estimated position. A straight line drawn at right-angles to the line of bearing, through the point thus obtained, will be the Sumner line required.[1]

This method rids the observer at once of the trammeling process of selecting a celestial body on or near the prime vertical for the computation of the longitude, and a celestial body on or near the meridian for the computation of the latitude, because it has the indisputable superiority of giving a Sumner line from the observation of a celestial body in any azimuth. But the drawing of this line requires the finding of the altitude and the corresponding azimuth at the estimated geographical position of the observer, and the determination of these elements by the ordinary formulas necessitates as much computation as navigators and geographers have been accustomed to perform in the calculation of time and longitude.

Purposing further to recommend to navigators the advantages of the method of St. Hilaire, Professor Souillagouët, of the French Navy, in the year 1900, published extensive tables, intended to shorten the work of calculating the altitude and azimuth, in a volume entitled "Tables du point auxiliaire pour trouver rapidement la hauteur et l'azimut estimés."

ALTITUDES.

The table for finding the altitudes is based upon the following conditions. In fig. 1, let P be the pole of the celestial sphere, Z the zenith of the observer, and A the position of the observed celestial body. Then, drawing a spherical perpen-

[1] The Sumner line is so called from its inventor, Capt. Thomas H. Sumner, an American shipmaster, who seems to have accidentally discovered its application to ocean navigation in 1837. If when at sea the navigator measures the apparent altitude of the sun, or any other celestial body whose right ascension, hour angle, and declination are known, he then knows that he must be somewhere on a small circle on the globe whose center is vertically beneath the sun or star. That portion of this circle passing through his assumed approximate position on the globe is called a Sumner line. If he can observe another celestial body, or if he can wait a while and observe the same body in a different position, he can draw a second Sumner line, and the intersection of the two will give him the location of his vessel with all the accuracy that is practicable. A full description of Sumner's method is given in works on navigation, and especially in the American Practical Navigator, Chapter XV, as published by the U. S. Hydrographic Office.—ED.

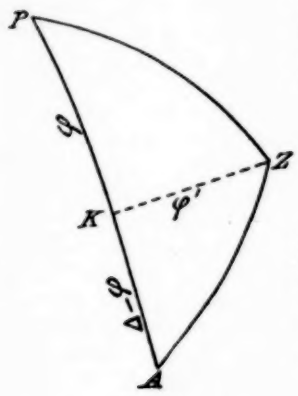

FIG. 1.

dicular from Z to K, and thus dividing thet riangle PZA into two right-angled spherical triangles, these relations exist:

$$\tan \varphi = \cot L \cos P \qquad (1)$$

$$\sin H = \left(\frac{\sin L}{\cos \varphi}\right)\cos(\Delta - \varphi). \qquad (2)$$

As the accompanying specimen page-heading (see Table 1) will show the arguments for entering the table are P, the angle at the pole, and L, the latitude; and the tabulated values are φ and $\log\left(\frac{\sin L}{\cos \varphi}\right)$, which are used in connection with Δ the codeclination or polar distance of the observed body, in the logarithmic computation of H, the altitude, in accordance with equation (2). Although the intervals between the values of the arguments for entering the table are set for 15′ of latitude and 1 minute of time, yet in problems in which the Sumner line is sought interpolation in entering the table may be avoided by an appropriate choice of the estimated geographical position.

TABLE 1.—*From page 61 of Souillagouët's Table.*

Lat.	20° 0′		20° 15′		20° 30′		20° 45′		Lat.
P	φ	Log.	φ	Log.	φ	Log.	φ	Log.	P
	° ′ ″		° ′ ″		° ′ ″		° ′ ″		
0h0m	70 0 0	0,00000	69 45 0	0,00000	69 30 0	0,00000	69 15 0	0,00000	60m
1	0 0	00000.	45 0	00000.	30 0	00000.	15 0	00000.	59
2	0 0	1,99999	45 0	1,99999	30 0	1,99999	15 0	1,99999.	58
3	69 59 55	99997.	44 55	99997.	29 55	99997	14 55	99997.	57
4	59 50	99994	44 50	99994.	29 50	99994	14 50	99994.	56
5	59 45	99991.	44 45	99991	29 45	99991.	14 45	99991	55
6	59 40	99987	44 40	99987.	29 40	99987	14 40	99987	54
7	59 30	99982	44 30	99982	29 30	99982	14 30	99982	53
8	59 20	99977	44 20	99977.	29 20	99977	14 20	99977	52
9	59 10	99970.	44 10	99971	29 5	99971.	14 5	99971.	51
10	59 0	99963	43 55	99964.	28 50	99964	13 50	99964.	50
11	58 45	99956.	43 45	99956	28 40	99956	13 40	99956.	49
12	58 30	99947	43 30	99498	28 30	99948	13 25	99948.	48
13	58 15	99938.	43 15	99938.	28 10	99939.	13 10	99939	47
14	58 0	99928	42 55	99929	27 50	99929	12 50	99929	46
15	57 40	99918.	42 35	99918	27 30	99918.	12 30	99919.	45
16	57 20	99906	42 15	99907	27 10	99907	12 10	99907.	44
17	56 55	99894.	41 55	99895.	26 50	99895	11 50	99895.	43
18	56 30	99882	41 30	99882.	26 30	99882	11 30	99883.	42
19	56 10	99868.	41 10	99869	26 5	99865.	11 5	99869	41
20	55 50	99854	40 45	99854.	25 40	99855	10 40	99855	40
21	55 20	99839.	40 20	99839	25 15	99840	10 15	99840	39
22	54 50	99823	39 50	99824	24 50	99824	9 45	99825	38
23	54 20	99807.	39 20	99807.	24 20	99808.	9 15	99808.	37
24	53 50	99790	38 50	99790	23 50	99791	8 45	99791	36
25	53 20	99772.	38 20	99772	23 15	99773	8 10	99774.	35
26	52 50	99753	37 45	99754.	22 40	99755	7 35	99755.	34
27	52 15	99733.	37 10	99734	22 5	99735.	7 0	99736	33
28	51 40	99713	36 35	99714.	21 30	99715	6 25	99716	32
29	51 5	99692	36 0	99693	20 55	99694	5 50	99695	31
30	50 30	99671	35 25	99672	20 20	99673	5 15	99674	30
31	49 50	99648.	34 45	99650	19 35	99651.	4 30	99652.	29
32	49 10	99625	34 0	99627	18 50	99628	3 45	99629.	28
33	48 25	99601.	33 20	99603.	18 10	99604	3 5	99605	27
34	47 40	99577	32 35	99578.	17 30	99580	2 20	99581	26
35	46 55	99552.	31 50	99553	16 45	99555	1 35	99556	25
36	46 10	99526	31 5	99527	16 0	99529	0 50	99530	24
37	45 25	99499.	30 20	99500.	15 10	99502.	0 0	99503.	23
38	44 40	99471	29 30	99473	14 20	99475	68 59 20	99476.	22
39	43 50	99443.	28 40	99445.	13 30	99447	58 20	99448.	21
40	43 0	99414	27 50	99416.	12 40	99418	57 30	99419.	20
41	42 5	99384.	26 55	99386	11 45	99388	56 35	99390.	19
42	41 10	99354	26 0	99356	10 50	99358	55 40	99360	18
43	40 15	99322	25 5	99325	9 55	99327	54 45	99329	17
44	39 20	99291	24 10	99293	9 0	99295	53 45	99297	16
45	38 20	99258.	23 10	99260.	8 0	99262.	52 45	99265.	15
46	37 20	99224	22 10	99227	7 0	99229	51 45	99231.	14
47	36 20	99190.	21 10	99192.	5 55	99195	50 40	99198.	13
48	35 20	99155	20 5	99157.	4 50	99160	49 35	99163	12
49	34 15	99119.	19 0	99122	3 45	99125	48 30	99128	11
50	33 10	99082	17 55	99086	2 40	99089	47 25	99092	10
51	32 5	99045	16 50	99048	1 35	99052	46 20	99055	9
52	31 0	99007	15 45	99011	0 30	99014	45 10	99017.	8
53	29 50	98968.	14 35	98972.	68 59 15	98975	44 0	98979.	7
54	28 40	98929	13 20	98932.	58 0	98936	42 45	98939.	6
55	27 30	98889	12 10	98892.	56 50	98896	41 30	98899.	5
56	26 20	98848	11 0	98851.	55 40	98855	40 15	98859	4
57	25 5	98806.	9 45	98810	54 20	98814	39 0	98818	3
58	23 50	98763	8 25	98767	53 0	98771	37 40	98776	2
59	22 30	98720	7 5	98724	51 40	98728	36 20	98733	1
60m	21 10	98676	5 45	98680	50 20	98685	35 0	98689.	0h11m
	0,000 +0	1,860 +1	1,668 +2	1,520 +3	1,406 +4	1,314 +5	1,238 +6	1,172 +7	1,116 +8	1,065 +9	

AZIMUTHS.

In order to construct within a limited volume tables giving the exact azimuth with all the generality required in St. Hilaire's method, that is to say, for all declinations and all values of the hour-angle of the celestial body, it is found necessary to have recourse to two successive entries. If the astronomical triangle PZA (fig. 2) be decomposed into two right-angled spherical triangles by drawing the spherical perpendicular AK from A to the opposite side PZ, the following relations exist:

$$\tan \varphi = \tan PA \cos P = \tan \Delta \cos P \qquad (3)$$

$$\cot Z = \cot \varphi' \sin KZ = \cot \varphi' \cos(L + \varphi). \qquad (4)$$

A specimen page of Souillagouët's azimuth table is also introduced here (see Table 2) in order that the following rules for using the table may be more readily explained:

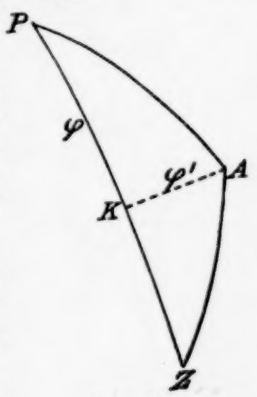

FIG. 2.

1. Find in the table the angle at the pole (vertical argument), and the declination (upper horizontal argument). This first entry gives the two auxiliary arcs φ and φ'. The arc φ is to be reckoned positive if the angle at the pole and the polar distance are of the same name, and negative if of a contrary name.

2. Find the algebraic sum of L and φ (regarding the latitude of the observer as always positive), and φ positive or negative as determined by the foregoing rule.

3. Enter a second time in the table with φ' as upper horizontal argument, and $L + \varphi$ (on the right or left) in column P. In column φ will be found an arc equal to the amplitude A (the complement of the azimuth).

Although the altitude and azimuth, which are conjointly needed in laying down the locus of geographical position by St. Hilaire's method, must be found separately, and each indirectly, by Professor Souillagouët's tables, his work has nevertheless, by reducing the tedium of numerical and logarithmic computation, accomplished a great advantage in oceanic navigation, and has been widely sought after and highly commended.

A further important advance, involving the accomplishment of a heavy and laborious task, has now been performed by Mr. Littlehales, Hydrographic Engineer of the United States Hydrographic Office, who has prepared for publication a volume in which the coordinates of the celestial sphere are in effect charted from minute to minute of arc for the whole circuit of the heavens in such a manner that, the charts being entered with the latitude of the observer and the declination and hour-angle of the observed celestial body as arguments, the altitude and azimuth may be simultaneously found without any computation whatever.

His plan of solution employs a stereographic projection of the celestial sphere on the *plane of the observer's meridian* such as that represented on a reduced scale in fig. 3.

If the latitude of the observer be laid off along the bounding meridian of the projection as at L, and the declination of

the observed celestial body be laid off at M along a meridian making an angle with the bounding meridian equal to the hour-angle of the observed celestial body, an astronomical triangle will be formed in which the known parts are the two sides PL and PM, representing, respectively, 90° minus the latitude and 90° minus the declination, and their included angle LPM, which is the hour-angle of the observed celestial body. Two of the unknown parts of this triangle are the azimuth PLM and the coaltitude LM of the observed celestial body. If the triangle PLM were revolved about the central point of the projection, with the side PL kept in coincidence with the bounding meridian until the point L is brought to the position of the point P, the latter would then occupy the position P', and the point M would fall at M', so that the unknown side of the triangle, representing the coaltitude, would lie along some meridian, and the altitude could be measured from the graduation of the projection. Thus the unknown angle, representing the azimuth, would become an included angle between two meridians, which could likewise be measured from the graduations of the projection. Thus the altitude and azimuth of any observed celestial body could be simultaneously determined from the diagram with any degree of precision that the scale of the projection might permit.

TABLE 2.—*From page 71 of Souillagouët's tables.*

P	Z	57° 30′		58° 0′		58° 30′		59° 0′		59° 30′		Z	P
		32° 30′		32° 0′		31° 30′		31° 0′		30° 30′			
		φ	φ′	φ	φ′	φ	φ′	φ	φ′	φ	φ′		
2h		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′		9h
0m	30°	28 53	15 35	28 25	15 22	27 57	15 9	27 29	14 55	27 2	14 42	150°	60m
2	30′	46	49	18	36	50	23	22	15 9	26 54	56	30′	58
4	31°	38	16 4	10	50	43	37	15	23	47	15 9	149°	56
6	30′	31	18	3	16 4	35	51	8	37	40	23	30′	54
8	32°	23	32	27 55	18	28	16 4	0	50	33	36	148°	52
10	30′	15	47	47	32	20	18	26 52	16 4	25	49	30′	50
12	33°	7	17 1	39	46	12	32	45	17	17	16 3	147°	48
14	30′	27 59	15	31	17 0	4	46	37	31	10	16	30′	46
16	34°	50	29	23	14	26 56	59	29	44	2	29	146°	44
18	30′	42	43	15	28	48	17 13	21	58	25 54	42	30′	42
20	35°	33	57	6	42	39	26	12	17 11	45	55	145°	40
22	30′	25	18 11	26 58	55	31	40	4	24	37	17 8	30′	38
24	36°	16	25	49	18 9	22	53	25 55	37	29	21	144°	36
26	30′	7	38	40	22	13	18 6	47	30	20	34	30′	34
28	37°	26 58	52	31	36	5	20	38	18 3	12	47	143°	32
30	30′	49	19 5	22	49	25 56	33	29	16	3	18 0	30′	30
32	38°	39	19	13	19 2	46	46	20	29	24 54	12	142°	28
34	30′	30	32	4	16	37	59	11	42	45	25	30′	26
36	39°	20	46	25 54	29	28	19 12	2	55	36	38	141°	24
38	30′	11	59	44	42	18	25	24 52	19 7	26	50	30′	22
40	40°	1	20 12	35	55	9	37	43	20	17	19 2	140°	20
42	30′	25 51	25	25	20 8	24 59	50	33	32	8	15	30′	18
44	41	41	38	15	21	49	20 3	24	45	23 58	27	139°	16
46	30′	30	51	5	33	39	15	14	57	48	39	30′	14
48	42°	20	21 4	24 54	46	29	28	4	20 9	38	51	138°	12
50	30′	9	17	44	59	19	40	23 54	22	28	29 3	30′	10
52	43°	24 59	30	34	21 11	8	52	43	34	18	15	137°	8
54	30′	48	42	23	24	23 58	21 5	33	46	8	27	30′	6
56	44°	37	55	12	36	47	17	22	58	22 58	39	136°	4
58	30′	26	22 7	1	48	36	29	12	21 10	47	50	30′	2
0m	45°	15	20	23 50	22 0	26	41	1	21	37	21 2	135°	0h0m
2	30′	4	32	39	12	15	53	22 50	33	26	13	30′	58
4	46°	23 52	44	28	24	3	22 5	39	45	15	25	134°	56
6	30′	41	56	16	36	22 52	16	28	56	4	36	30′	54
8	47°	29	23 8	5	48	41	28	17	22 8	21 53	47	133°	52
10	30′	17	20	22 53	23 0	29	39	6	19	42	58	30′	50
12	48°	5	32	41	11	18	51	21 54	30	31	22 9	132°	48
14	30′	22 53	44	29	23	6	23 2	42	41	19	20	30′	46
16	49°	41	55	17	34	21 54	13	31	52	8	31	131°	44
18	30′	29	24 7	5	46	42	25	19	23 3	20 56	42	30′	42
20	50°	16	18	21 53	57	30	36	7	14	44	53	130°	40
22	30′	3	30	41	24 8	18	47	20 55	25	32	23 3	30′	38
24	51°	21 51	41	28	19	5	57	43	36	20	14	129°	36
26	30′	38	52	15	30	20 53	24 8	30	46	8	24	30′	34
28	52°	25	25 3	2	41	40	19	18	57	19 56	34	128°	32
30	30′	12	14	20 50	52	27	29	5	24 7	44	45	30′	30
32	53°	20 59	25	36	25 2	15	40	19 53	17	31	55	127°	28
34	30′	45	35	23	13	2	50	40	27	19	24 5	30′	26
36	54°	32	46	10	23	19 48	25 0	27	37	6	15	126°	24
38	30′	18	56	19 57	33	35	10	14	47	18 53	24	30′	22
40	55°	4	26 7	43	44	22	20	1	57	40	34	125°	20
42	30′	19 50	17	29	54	8	30	18 48	25 7	27	43	30′	18
44	56°	36	27	16	26 4	18 55	40	34	17	14	53	124°	16
46	30′	22	37	2	13	41	50	21	26	1	25 2	30′	14
48	57°	8	47	18 48	23	27	59	7	35	17 47	11	123°	12
50	30′	18 54	57	33	33	13	26 9	17 54	45	34	21	30′	10
52	58	39	27 6	19	42	17 59	18	40	54	20	30	122°	8
54	30′	25	16	5	52	45	27	26	26 3	6	38	30′	6
56	59°	10	25	17 50	27 1	31	36	12	12	16 53	47	121°	4
58	30′	17 55	35	36	10	17	45	16 58	21	39	56	30′	2m
60m	60°	40	44	21	19	2	54	43	29	25	26 4	120°	0h0m

To obviate the necessity for actual revolution of the triangle, as described above, a series of equally spaced concentric circumferences and a series of equally spaced radial lines have been drawn over the projection, as shown by the lines of dashes in fig. 3. For the purpose of identification, the overlaid system of concentric circumferences is numbered serially from the center of the projection outward to the bounding meridian. The radials are also marked by numbers indicating their angular distance in minutes of arc counted in a clockwise direction from the line OS. After having plotted the declination and hour-angle of the observed celestial body at M, it is only necessary to note the number of the circumference and the number of the radial which pass through this position;—add to the number of the radial 90° minus the latitude, expressed in minutes; find the intersection, M', with the noted circumference, of the radial whose number is the sum just found, and read off from the graduated arcs of the projection the altitude and azimuth of this point of intersection.

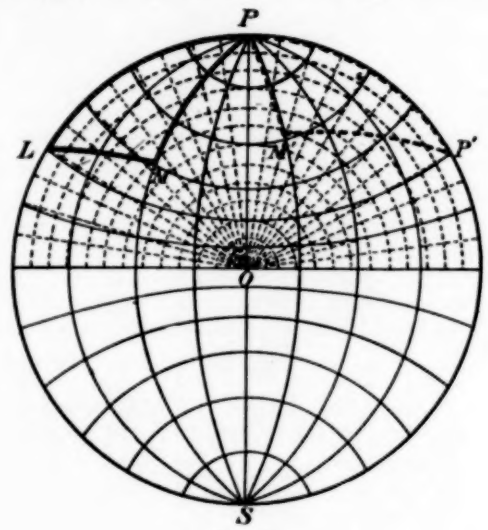

FIG. 3.

In order that the required results may be found to the nearest minute of arc, the stereographic projection has been constructed for a sphere whose diameter is twelve feet, but this being too large for ordinary use when kept in one continuous sheet, Mr. Littlehales cuts each of the four quadrants into 92 overlapping sections, all conveniently indexed and arranged to form a volume of 368 pages. In this form the projection can be used with the same facility as if preserved in one continuous sheet, for it has been pointed out that in effecting the required solution only those parts of the projection are involved which lie in the immediate vicinity of the points whose coordinates are to be plotted or read off.

The simplicity and directness of this method will be more clearly seen by examining an example of the solution of a problem in navigation.

Example.—At sea, April 2, 1902, about $6^h\ 35^m$ p. m., in latitude 39° 16′ north and longitude 60° 00′ west by estimation. Observed α Aurigæ, bearing north 60° west per compass, to be in altitude 66° 22′ when the Greenwich mean time, as shown by the chronometer, was $10^h\ 31^m\ 03.2^s$. Required the Sumner line of geographical position and the total error of the compass.

From the statement of the problem and from the Nautical Almanac, the hour-angle of α Aurigæ is found to be $2^h\ 02^m\ 54^s$ or 30° 43′ 30″, and the declination to be 45° 53′ 56″ north.

Note.—Plotting the declination and hour-angle roughly with reference to the parallels and meridians (counted from the left-hand bounding meridian) of the Index to Plates, (fig 4), we find that the position of the observed body falls on plate 51, (fig. 5), approximately at the intersection of circumference 17.2 with radial 8400. Then adding 8400 to 90° minus

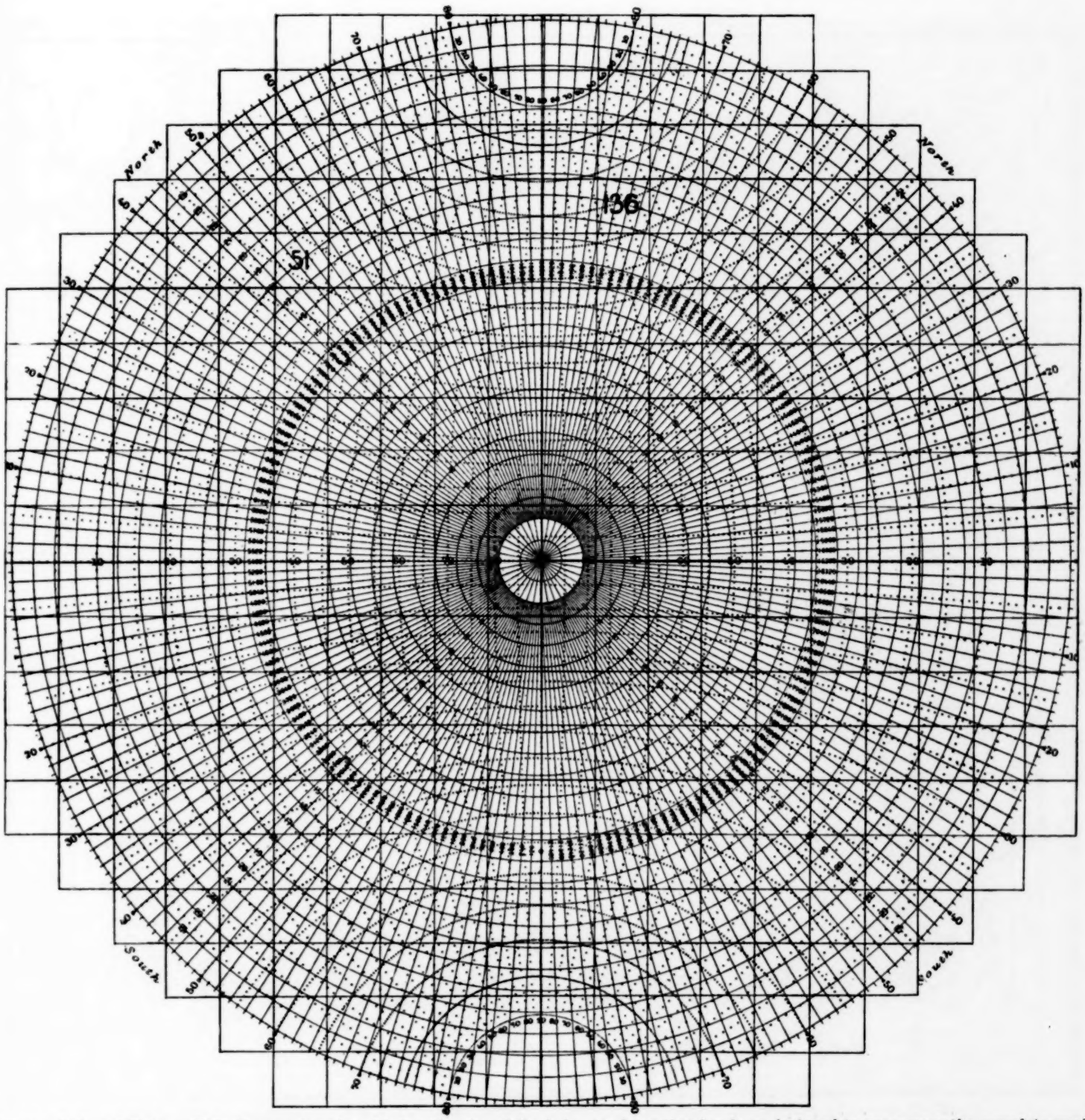

FIG. 4.—Index of Plates. This diagram is reduced below the size of the index to plates that has been designed to accompany the complete work.

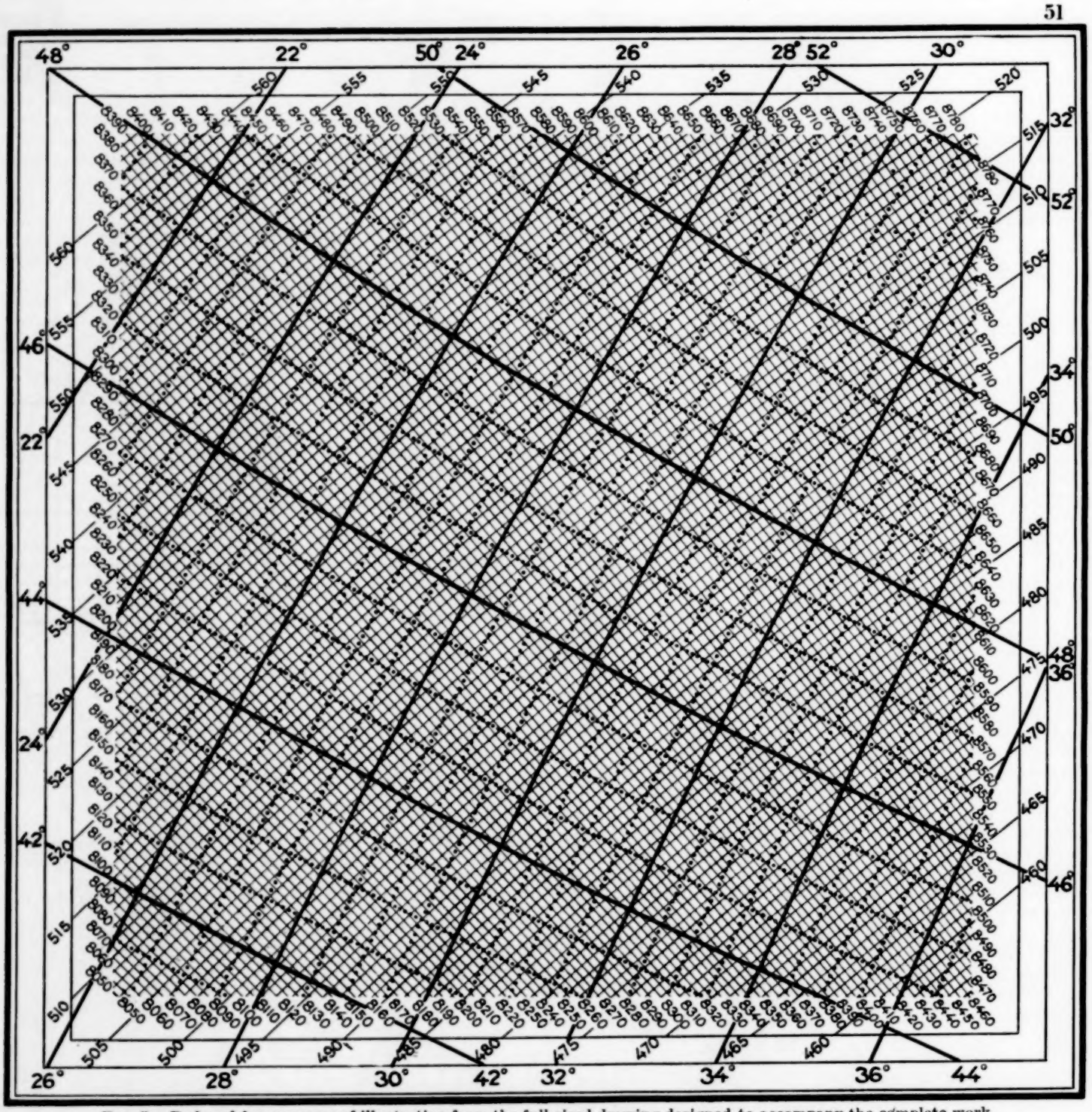

FIG. 5.—Reduced for purposes of illustration from the full-sized drawing designed to accompany the complete work.

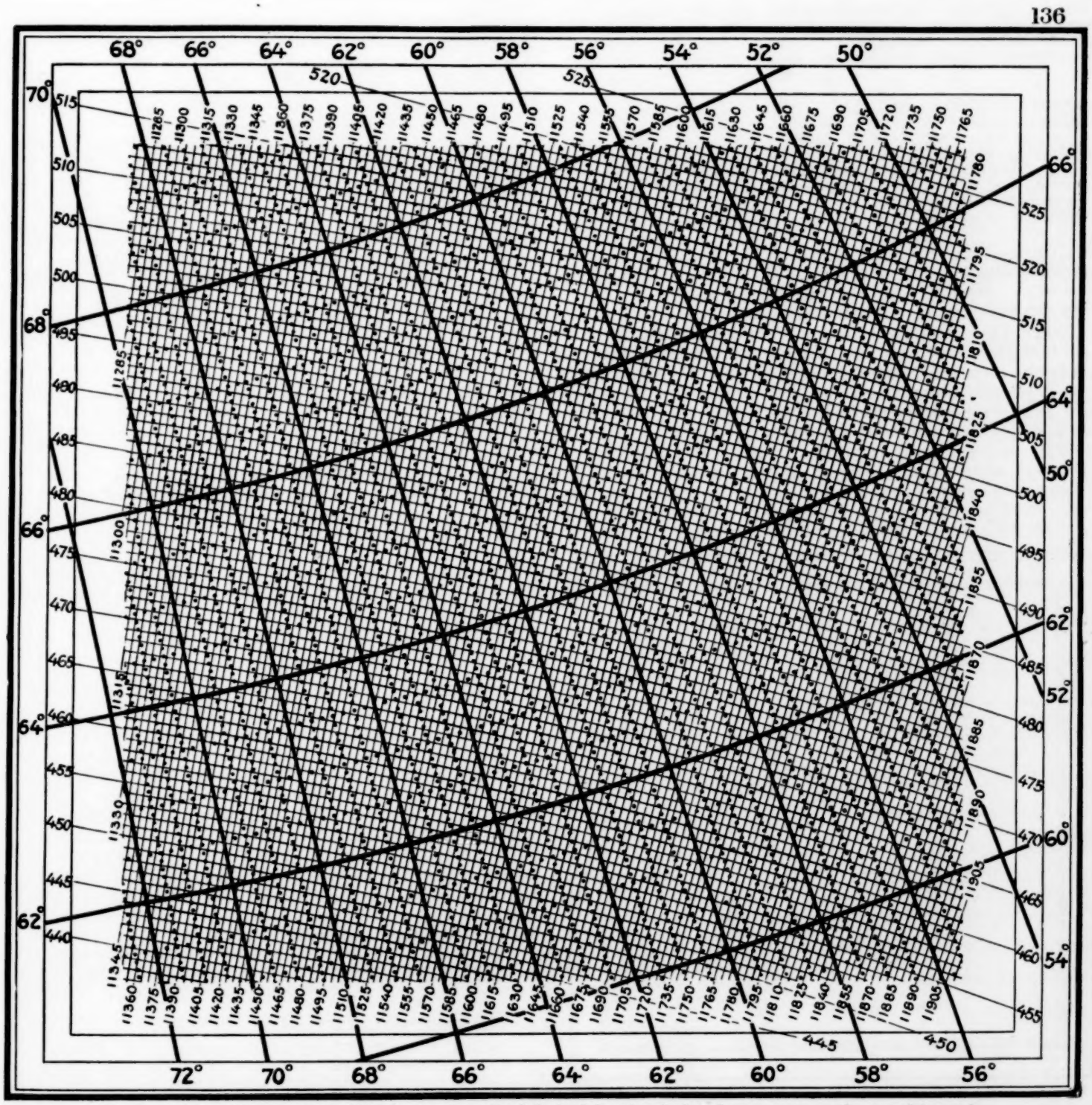

FIG. 6.—Reduced for purposes of illustration from the full-sized drawing designed to accompany the complete work.

the latitude expressed in minutes, which is 3044, we find the approximate place of the revolved position to be at the intersection of circumference 17.2 with radial 8400 + 3044 = 11444, which intersection falls within the limits of plate 136, (fig. 6). Turning now to plate 51 (fig. 5), and plotting the hour-angle and the declination to the nearest minute, we find the position of the observed body to fall at the intersection of circumference 495.6 with radial 8411. Adding 90° minus the latitude expressed in minutes to the number of this radial we obtain 8411+3044=11455 as the number of the radial, at whose intersection with circumference 495.6, on plate 136, (fig 6), the solution is to be found by reading off the altitude with reference to the parallels and the azimuth with reference to the meridians, counting from the right-hand bounding meridian.

Solution.

Hour-angle 30° 43.5′ } ..... { Circ. 495.6
Declination 45° 54 0′ } { Rad. 8411
Lat. N. 39° 16′: colat. 50° 44′.....3044

Rad. 11455 } { 66° 36′ altitude.
Circ. 495.6 } { N. 63° 32′ W. azimuth.

True altitude by observation	66° 22′
Altitude due to estimated position	66 36
Δ_h	14
True bearing	N. 63° 32′ W.
Compass bearing by observation	N. 60 00 W.
Total error of compass for heading of ship when observation was made	3° 32′ W.

It should not escape attention that the whole work, which we have now performed, of finding the star's altitude and azimuth due to the estimated geographical position of the ship may be done before the observer goes on deck to measure the actual altitude at the prearranged instant of Greenwich mean time, and that no more time need subsequently elapse in drawing the Sumner line than is required for taking the difference of the two altitudes Δ_h and laying it off as an intercept along the line of true bearing of the observed body in the proper direction from θ the estimated geographical position of the observer, as has been done on the small chart, fig. 7.

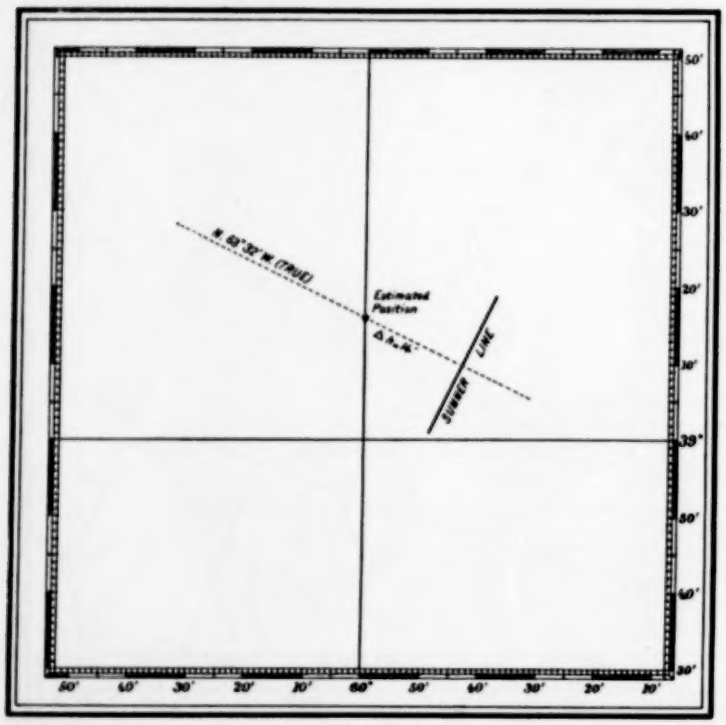

FIG. 7.

Frequently a star that is favorably placed for observation can not be identified because clouds obscure the surrounding parts of the sky. If, when the altitude of such a star is measured, its compass bearing be observed, and the approximate true azimuth be obtained by correcting the bearing for the variation and deviation of the compass, then the identity of the star may at once be ascertained by reversing the order of proceeding that has just been described for finding the altitude and azimuth from the declination and hour-angle. Having plotted the corrected altitude of the star on the meridian of the projection which makes an angle with the right-hand bounding meridian equal to the star's azimuth counted from the North Pole, note the number of the radial and the number of the circumference that pass through the point so plotted. Subtract 90° minus the latitude of the place of observation, expressed in minutes, from the number of the radial; find the intersection of the noted circumference with a second radial whose number is the remainder thus found by subtraction, and read from the graduations of the projection the declination of this point and its hour-angle from the left-hand bounding meridian. The hour-angle of the observed star thus found must be converted into right ascension. Then the star tables of the Nautical Almanac may be scanned to find the name of the star whose tabulated right ascension and declination come nearest to the values of the right ascension and declination that have been deduced. The stars that are of a sufficient magnitude to be observed by navigators are so widely separated that there will be no difficulty in making the selection from the tables, even when we proceed no further than the use of the index to plates in effecting the required solution.

It will be found upon examination that these graphical tables are also adapted to find, with very great facility, the course and distance in great circle sailing, and that they provide a sure and simple solution, with a degree of precision limited only by the scale of construction, for all those problems of trigonometry and nautical astronomy that depend upon solving a spherical triangle in which two sides and the included angle are given.—*X.*

The Editor would commend Mr. Littlehale's methods and his charts to the serious attention of all who have occasion to solve spherical triangles to the nearest minute of arc—whether in geodesy, navigation, astronomy, or general mathematical work.—ED.

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R. A. EDWARDS, Acting Librarian.

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—— The Antarctic problem. [Abstract of address by Clements Markham.] Pp. 376–378.
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Simpson, George C. Potentialregistrierungen und Zerstreuungsmessungen in hohen Breiten. Pp. 267–269.
Conrad, V. Bemerkung zu den luftelektrischen Untersuchungen von G. C. Simpson. Pp. 269–270.
Hann, J. Ueber den täglichen Gang der Temperatur in der inneren Tropenzone. Pp. 270–271.
Hann, J. Resultate der meteorologischen Beobachtungen zu Addis-Abeba und Addis-Alem im Basin des Hauash in Abessinien. Pp. 271–272.
—— Teisserenc de Bort über die Schwankungen der Temperatur in grossen Höhen der Atmosphäre. [Abstract of article by Teisserenc de Bort.] Pp. 272–273.
Hann, J. Resultate der meteorologischen Beobachtungen in Buitenzorg 1901. Pp. 273–275.
Hann, J. Zum Klima von Winnipeg (Manitoba). 30 jährige Temperaturmittel, Temperaturveränderlichkeit, Temperatur-Extreme, Regenmenge. Pp. 275–277.
Hergesell, H. Drachenaufstiege auf dem Mittelländischen Meere und auf dem Atlantischen Ozean. Pp. 277–279.

Quervain, A. de. Die tiefste bisher beobachtete Temperatur der Atmosphäre. Pp. 279–280.

Busch, Fr. Der Bishop'sche Ring während der letzten atmosphärisch-optischen Störung, beobachtet zu Arnsberg. Pp. 280–282.

Busch, Fr. Niederschlag und Wasserführung der Flüsse Mitteleuropas. Pp. 282–284.

—— Gewitter und Kugelblitze in Krakau. P. 284.

Bemmelen, W. van. Messungen der lichtelektrischen Zerstreuung während der ringförmigen Sonnenfinsternis am 17. März 1904. Pp. 284–285.

Rudel, —. Unzuverlässigkeit des Gewitterregistrators. Pp. 285–286.

—— Kälte in der Sahara. P. 286.

—— Temperaturumkehrungen auf dem Ben Nevis. P. 286.

—— Blitzschlag in eine der Pyramiden. P. 286.

Hemel en Dampkring. Amsterdam. 3 Jahrgang.

Szalay, Ladislaus von. Over fotografiën van bliksemstralen. Pp. 19–23.

Hissink, C. W. Zodiakaallicht waargenomen te Zutphen, door C. W. Hissink, in het voorjaar van 1905. P. 24.

Nell, Chr. A. C. De halo's. Pp. 25–29.

Bolétim da Sociedade de Geographia de Lisboa. Lisboa. 23 série.

Osario, Augusto da Carvalho. Espectro de Brocken na Serra da Arrabida. P. 162.

Berthoud, Paul. Météorologie de Lourenço Marques. Pp. 163–164.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

R. A. EDWARDS, Acting Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

American Forest Congress.
Proceedings of the American Forest Congress. Held at Washington, D. C., January 2 to 6, 1905, under the auspices of the American Forestry Association. xi, 474 pp. 12°. Washington. 1805.

Baden. Centralbureau für Meteorologie und Hydrographie.
Deutsches Meteorologisches Jahrbuch für 1904. Baden. Sonderabdruck des II. Teiles des Jahresberichtes des Zentralbureaus für Meteorologie und Hydrographie für 1904. Bearbeitet von Prof. Dr. Ch. Schultheiss. 75 pp. f°. Karlsruhe. 1905.

France. Commission Météorologique de l'Hérault.
Bulletin Météorologique de l'Hérault. Année 1904. 132 pp. 4°. Montpellier. 1905.

France Commission Météorologique du Département de la Haute-Garonne.
Bulletin de la Commission Météorologique du Département de la Haute-Garonne. Tome I. Troisième fascicule 1903. 151–222+ 75–96 pp. 4°. Toulouse. 1904.

Great Britain. Meteorological Office.
Meteorological observations at stations of the second order for the year 1900. Published by direction of the Meteorological Council. xiii, 181 pp. f°. London. 1905.

Grenander, S.
Les gradients verticaux de la température dans les minima et les maxima barométriques. (Arkiv för matematik, astronomi och fysik utgivet af K. Svenska Vetenskapsakademien i Stockholm. Band 2. No. 7.) 15 pp. 8°. Upsala. 1905.

Hamburg. Deutsche Seewarte.
Deutsche überseeische meteorologische Beobachtungen. Heft XIII, 1905. Meteorologische Beobachtungen in Deutsch-Ost-Afrika. 317 pp. f°. n. p. n. d.

International Latitude Observatory of Mizusawa.
Annual report of the meteorological and the seismological observations made at the International Latitude Observatory of Mizusawa for the year 1904. 11 pp. f°. Mizusawa. 1905.

Japan. Cen ral Meteorological Observatory.
Annual report of the Central Meteorological Observatory of Japan for the year 1902. Part 1. Meteorological observations in Japan. 239 pp. 4°. Tokio. 1905.

Kremser, B.
Sonnenlose Tage. (Sonder-Abdruck aus "Das Wetter," Heft 5, 1905.) 7 pp. 8°.

Liverpool Observatory.
Report of the Director of the Observatory to the Marine Committee, and meteorological results deduced from the observations taken at the Liverpool Observatory, Bidston, Birkenhead, in the year 1904. 41 pp. 8°. Liverpool. 1905.

Meteorological Observatory, St. Ignatius College.
Tenth annual report of the Meteorological Observatory. 15 pp. 8°. Cleveland. 1904–1905.

Observatorio del Colegio de Belen.
Observaciones magneticas y meteorologicas hechas en el Observatorio del Colegio de Belen de la Compania de Jesus en la Habana. Ano de 1904. f°. Habana. 1905.

Physikalischer Verein zu Frankfurt am Main.
Jahresbericht des Physikalischen Vereins zu Frankfurt am Main für das Rechnungsjahr 1903–1904. 102 pp. 8°. Frankfurt am Main. 1905.

Prussia. Königliches Preussiches Meteorologisches Institut.
Ergebnisse der Niederschlags-Beobachtungen im Jahre 1901. Von G. Hellmann. Veröffentlichungen des Königlich Preussichen Meteorologischen Institute. Herausgegeben durch dessen Direktor Wilhelm von Bezold. lviii, 236 pp. f°. Berlin, 1905.

Russia. Meteorological Observatory of the Imperial Institute of Forestry at St. Petersburg.
Observations de l'Observatoire Météorologique de l'Institut Forestier Impériale à St. Petersbourg. 37 pp. f°. St. Petersburg. 1905.

Solar Physics Observatory.
Mean annual variations of barometric pressure and rainfall in certain regions. 16 pp. 17 plates. f°. London. 1905.
Solar Physics Observatory report, 1904. 41 pp. 8°. n. t. p.

Stacya Centralna Meteorologiczna przy Museum Przemyslu i Rolnictwa w Warsawie, r. 1904. 30 pp. 4°. n. p. 1905.

Voeikov, Aleksander Ivanovich.
Les lacs du type polaire et les conditions de leur existence. (Extrait des Archives des Sciences Physiques et Naturelles. 4 pér. T. 16. Sept. 1903, p. 300 à 309.) 10 pp.
Einige Probleme der Seenkunde. (Aus: Zeitschrift für Gewässerkunde. 5 Band. Heft 1.) 15 pp.
Referate über russische Forschungen auf dem Gebiete der Meteorologie. (Separat-Abdruck aus der "Meteorologischen Zeitschrift," Heft 10, 1903.) Pp. 451–458.

Ward, Robert DeCourcy.
The climatic zones and their subdivisions. (Reprinted from Bulletin of the American Geographical Society, July, 1905.) 12 pp.

Wilson-Barker, D.
The connection of meteorology with other sciences. (From the Quarterly Journal of the Roy. Met. Soc. v. 31.) P. 85–95.

ANNUAL RINGS OF TREE GROWTH.

By Prof. E. E. BOGUE, Agricultural College, Lansing, Mich. Dated June 25, 1905.

I made an investigation of the seasonal and annual rapidity of growth of trees in Stillwater, Okla., covering the time from October 1, 1898, to September, 1901. Twenty-seven trees were carried through the entire time. Among them were five soft maples (*Acer saccharinum*) planted along the street for shade, and the rest were fruit trees and included varieties of plum, peach, cherry, apple, quince, pear, Russian mulberry, and apricot.

Nearly all the trees were yearlings, or two-year-olds, planted in the spring of 1898. The maximum growth was not the same for any two of the three seasons. The official meteorological station is about one-half mile from where the trees grow. There is no marked difference between the elevations of the two places nor any reason to suppose that the climate of the two places would vary. Table 1 gives the average increase in girth, expressed in millimeters, for the group of 27 trees during the respective months, as also the corresponding monthly rainfall, expressed in inches.

TABLE 1.—*Average increase in the girth of 27 trees, measured monthly at Stillwater, Okla.*

Months.	1898.		1899.		1900.		1901.	
	Rain.	Girth.	Rain.	Girth.	Rain.	Girth.	Rain.	Girth.
	Ins.	*mm.*	*Ins.*	*mm.*	*Ins.*	*mm.*	*Ins.*	*mm.*
January	.....	.....	0.48	—1.37	0.23	—0.22	0.62	—1.11
February	.....	.....	0.47	0.66	0.79	0.41	0.59	1.33
March	.....	.....	1.03	0.22	0.51	—0.15	2.95	0.55
April	.....	.....	4.97	1.70	4.43	6.18	1.29	3.63
May	.....	.....	5.61	13.33	3.71	18.51	5.70	15.51
June	.....	.....	3.64	20.20	3.28	20.60	0.79	11.60
July	.....	.....	4.45	20.25	2.69	15.10	1.48	9.33
August	.....	.....	2.57	10.44	1.39	5.10	1.95	4.33
September	.....	.....	0.88	5.11	9.22	6.40	.....	.....
October	4.19	4.74	5.15	1.37	2.87	1.59	.....	.....
November	0.68	0.89	1.93	—0.15	0.65	0.51	.....	.....
December	2.68	1.11	1.60	—0.74	0.21	—0.15	.....	.....
Annual total	.....	.....	32.78	81.02	29.98	73.88	.....	.....

It will be seen that the month of maximum rainfall is also the month of maximum growth. The two records for September show a deviation from the rule. October, 1898, shows a relation quite different from that of the same month in the other two years. It is not likely that the trees could use a high per cent of the abnormal precipitation for September, 1900. There was a distinct falling off in the growth for June, 1901, as compared with the same month in the other years, probably due to lack of rainfall during that month. The growth for May, 1901, as compared with the precipitation for that month can not be attributed to the heavy rainfall during the latter part of the previous month, because the records show that not more than an inch fell on any day, except the 10th, with 1.50, and the 28th, with 1.04.

TABLE 2.—*Rainfall and average width of annual rings of growth for 42 trees.*

	Year.												
	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.
Rain or melted snow in inches.	29.92	31.29	19.30	22.80	35.20	33.61	31.72	23.67	31.62	32.49	38.50	31.53	23.08
Average width of ring, in inches.	.1174	.1157	.1059	.0864	.1236	.1359	.1336	.1195	.1421	.1371	.1595	.1645	.1376

Table 2 gives the average width of ring of 42 trees of 15 different species measured on the stump to hundredths of an inch and the rainfall for each year during the period from 1892 to 1904, both inclusive. These data were gathered at Agricultural College, Mich., about four miles east of Lansing and within a radius of one mile of the observation station from trees that had not suffered any radical change in environment during that time.

The small amount of rain in 1894 appears in the tree growth of the following year, and the abnormally large amount of precipitation in 1902 probably had some influence on the width of ring in 1903. The numbers, rounded off, show that a precipitation of from 30 to 35 inches in this latitude (42° 45′ 56″) gives a width of ring from 0.11 to 0.15 inch and that abnormally large or small precipitation is evidenced by the tree growth of the following year. The young leaves and long tender shoots that are put out during the early part of any season in this latitude are evidently formed from material that was stored the previous season. There is now at hand a section of a butternut stem, about four inches in diameter and four feet long, that was cut and put into storage last winter, 1904–5, that has sent out two sprouts, one five and the other ten inches long. The piece has been standing on a cement floor in a barn where no moisture was available except from the air. Piles of logs and logs of houses have often demonstrated the same thing.

In Table 1 it will be noticed that in some cases, all in the winter months, the average was less for a certain month than for the month previous. This obtains because of the frozen trees at time of measurement, the frozen stem being smaller than at zero centigrade.

We may conclude that there is a general direct relation between precipitation and tree growth.

NOTES AND EXTRACTS.

THE SCIENTIFIC STAFF OF THE WEATHER BUREAU.

Readers of the MONTHLY WEATHER REVIEW will be interested to learn that on the first of July the force of the Weather Bureau was notably increased by the appointment of (1) Prof. William J. Humphreys, of the University of Virginia, as Professor of Meteorological Physics, assigned in charge of Mount Weather Observatory; (2) Mr. James Page, of the U. S. Hydrographic Office, as Section Director in charge of the Division of Ocean Meteorology; (3) Mr. Louis G. Schultz, of the Magnetic Survey of the Argentine Republic, as Research Director, assigned in charge of the magnetic work at Mount Weather; and (4) Mr. Herbert L. Solyom, of the U. S. Patent Office, as Research Observer, temporarily assigned to the Yerkes Observatory of the University of Chicago, at Williams Bay, Wis.

In connection with these important appointments, preparatory to the research work at Mount Weather, we note also the assignment of Mr. H. H. Kimball, Librarian and Climatologist, to special work at the Astrophysical Observatory of the Smithsonian Institution, where he will conduct bolometric work during the present summer. This assignment reminds one of the analogous cases that occurred in 1883 when Messrs. McAdie, Morrill, Fassig, and McRae were sent to study electrical methods under the famous electricians at Harvard, Yale, and Johns Hopkins preparatory to the work of the service in atmospheric electricity.

These appointments respond to the current needs of the service in three different directions. Professor Humphreys brings with him the reputation of being fully up to date in all that relates to experimental physics, and his assignment to the Mount Weather Observatory gives assurance that the work at that institution will satisfy the most exacting demands.

Mr. Schultz, who has for some years been absent from the service, on furlough, first conducting magnetic work for the U. S. Coast and Geodetic Survey at Cheltenham, Md., and subsequently organizing the magnetic work of the Argentine Republic, now returns from inspecting European stations and goes to conduct similar work at Mount Weather.

Mr. Page, who has long been connected with the Hydrographic Office of the U. S. Navy Department, and has been widely known as the editor of the Pilot Chart and the author of many excellent articles relative to ocean meteorology, is now transferred to the Weather Bureau, to which the study of ocean meteorology has also been entrusted.

Eventually Mr. Solyom will do work at Mount Wilson, Cal., in atmospheric physics for comparison with similar work at Mount Weather.

These appointments, marking, as they do, the beginning of a brilliant epoch in the history of the Weather Bureau, may also be looked upon as celebrating in the most appropriate manner the tenth anniversary of the appointment of our Chief to his present position. It is very important that the service should be strengthened in the direction of physical and mathematical research; for many years it has been stated, as a criticism of the policy of the service, that we have not encouraged the ablest men in the country to take up the study of meteorology, and, therefore, those who would gladly have devoted themselves to our work have carved out for themselves brilliant careers in other branches of science, leaving meteorology alone until the Weather Bureau shall see fit to encourage them. There are, perhaps, a half dozen well known men who stand in this category, and doubtless before many years have passed some of these, or their students, will have to be set at work upon our problems.

Everyone must recognize the fact that the great desire of Prof. Willis L. Moore has been to secure harmony among the employees and enthusiastic devotion to the interests of the service; this also means devotion to the best interests of meteorology, since our knowledge of that science and our expertness in its practical applications must be increased if the work of the Weather Bureau is to retain the support, the confidence, and the affection of all classes of citizens. At the

present time we believe that intelligent Americans appreciate the storm, weather, and flood services as heartily as they do the work of any other branch of the Department of Agriculture, or as they do the work of our Navy, or the charts, hydrology, and geology of the Geological Survey. In fact the Fish Commission, the Forestry Division, the Bureau of Animal Industry, the Bureau of Plant Industry, the Geological Survey, the Coast Survey, and the Weather Bureau vie with each other in their efforts to serve the country and advance the welfare of every individual. Every one seems to look most expectantly and anxiously to the Weather Bureau to make still greater advances and ultimately to solve the problem of making successful long-range forecasts. Now this problem can only be solved, if at all, by studying the whole atmosphere as a unit. The Weather Bureau needs to study both the ocean and the land, both the polar and the equatorial regions, both the lower and the upper atmosphere; an international chart of the world must be published daily, and the resumption of our former work in ocean meteorology is undoubtedly a step toward realizing this desideratum. The atmosphere up to its greatest height must be studied by means of the polarimeter, the actinometer, the balloon and kite ascensions; and the Mount Weather Research Observatory will undoubtedly carry out such work. Our problems in the mechanics of the earth's atmosphere must consider not any one layer alone, but the whole envelope of the globe. If we neglect viscosity, diffusion, and vertical variation of gravity as matters of minor importance, we must take full account of the irregularities of the earth's surface, and the variations of atmospheric pressure, temperature, and moisture. Whether or no we must take account of the variations of the solar radiation is generally considered problematical. If, as some believe, there are important relations between meteorological phenomena and those of terrestrial magnetism and solar physics, then the magnetic work at Mount Weather may give the data for the elucidation of that branch of science.

The following general statement of the organization of the special research staff of the Weather Bureau has been authorized by the Chief of Bureau:

AT WASHINGTON.

Director.—The Chief.

Board of advisers.—Prof. Cleveland Abbe, Prof. Charles F. Marvin, Prof. Frank H. Bigelow (*chairman*), Prof. Edward B. Garriott, Prof. Henry J. Cox, Prof. Alfred J. Henry, Prof. Alexander G. McAdie, Prof. Harry C. Frankenfield, and Prof. William J. Humphreys.

AT MOUNT WEATHER.

Supervising director.—Prof. William J. Humphreys, who shall have detail supervision of all work in the physical laboratory and solar physics observatory and general, rather than detail, supervision of other researches. He will aid the research directors in matters wherein his knowledge may be of assistance, and will be an adviser rather than a director of their research; although in all matters of cooperation between research directors he will have the controlling voice. He will have charge of the discipline of the institution, referring to the Chief such matters as can not be settled at the station.

Mr. Herbert H. Kimball, who, through the courtesy of Prof. S. P. Langley, is receiving special training at the Smithsonian Institution in the use of the bolometer, will be Professor Humphreys's principal aid in solar physics, and Mr. Herbert L. Solyom, who, by the kindness of Prof. E. B. Frost, is doing special work at the Yerkes Observatory, will be an additional assistant.

Director of magnetic and electric research.—Mr. Louis G. Schultz, who shall have charge of the magnetic observatories and observations in atmospheric electricity and special electric and magnetic research.

Director of upper air research.—Dr. Oliver L. Fassig, who shall have charge of balloon and kite observations and the discussion thereof. Messrs. Schultz and Fassig will arrange for cooperation in the taking of electrical observations from kites.

Observer in charge of property.—Mr. Charles S. Wood, who, under the general control of the supervising director, shall have charge of the premises, repairs, improvements, heating and lighting, power plants, horses and vehicles, meteorological observations and forms, and the mess and the forage funds. He may correspond direct with the central office in regard to the details of the work with which he is charged.

Each official will discuss his own observations and, so far as possible, correlate the events shown by his reports with those indicated by the observations of others. There will be a cheerful willingness to cooperate for the general good of the institution and the advancement of the science of meteorology.

There will be no publication in the bulletins of the Bureau of mere argument of abstract theories in science. The place for such is in scientific publications, which are open to all. No more data will be published in the announcement of results than are necessary to make clear the subject matter, except when the data are new.

The prime object of the institution, which is the taking of observations and the gathering of data with which to make experimentation and prosecute research, will be kept in mind. Unpublished data will be open to the use of all recognized investigators, and cooperation with other scientific workers will be encouraged. Questions that may directly or indirectly be of value to the science of meteorology will be proper subjects for investigation. The field of inquiry will, therefore, be a broad one.

INVENTIONS PATENTED BY GOVERNMENT EMPLOYEES

The following is the text of Circular No. 3 of the Department of Agriculture, mentioned on page 209, of the MONTHLY WEATHER REVIEW, for 1905.

Hereafter whenever any employee of the Department makes any new and useful discovery or invention of any machine, device, or process connected with the work of the Department, through the expenditure of Government time and Government money, he is directed to cause a patent to be applied for on the said discovery or invention, through the law officer of the Department, i. e., the Solicitor. The patent will be taken out in the name of the inventor, without any expense to him, and will allow to any citizen of the United States the use of the patented article or process without payment of royalty.

All employees of this Department are prohibited from patenting any device or process or discovery connected with the work of the Department except in the manner above described.

SEISMOLOGY IN THE UNITED STATES.

Inasmuch as the gentlest earthquake sets into oscillation, from a purely gravitational point of view, the magnetic needles that record their positions photographically in the standard magnetic observatories, therefore the Coast and Geodetic Survey keeps an independent record of earthquakes at its magnetic observatories at Cheltenham, Md.; Honolulu, Hawaii; Sitka, Alaska; and Isabel, Vieques Island, near Porto Rico. Similar records are also kept at Toronto, Ont.; Victoria, B. C.; Baltimore, Md.; Mount Hamilton, Cal.; St. Louis, Mo., and the Weather Bureau at Washington. In addition to the mechanical disturbance of magnetic records there are also some occasions on which earthquakes seem to be accompanied by true magnetic disturbances. In still other cases distinct and continuous earth tremors appear to be associated with certain meteorological conditions.

For many years the earthquakes recorded by both regular and cooperative observers of the Weather Bureau were published in the MONTHLY WEATHER REVIEW, in order that the data might become available to students of seismology. Recent arrangements have, however, been made by which American earthquake data will be published both by the U. S. Geological Survey and in Dr. Bauer's international quarterly journal "Terrestrial Magnetism and Atmospheric Electricity." Therefore, the MONTHLY WEATHER REVIEW will hereafter confine its notes on earthquakes to the publication of records at its own stations and such special cases as appear to require notice in our columns.

At the urgent request of the Editor, a general earthquake committee was appointed in 1882, and eventually the U. S. Geological Survey concluded to give some attention to this subject, which truly belongs to geophysics as a part of geology.

According to the 25th Annual Report of the Director of the U. S. Geological Survey, Prof. Harry Fielding Reid, of the Johns Hopkins University, has been placed in charge of earthquake data as a special expert. The report says:

During the fiscal year 1903–4 Professor Reid kept a careful record of all earthquakes occurring in the United States about which any information could be obtained, either from the newspapers, the reports of the Weather Bureau and the Light-House Board, or by correspondence. Special information was collected regarding the earthquake of November 4, 1903, which was felt throughout a large section southeast of St. Louis, and also regarding that of March 21, 1904, which was felt in the extreme northeastern part of this country and in Nova Scotia.

Upon the invitation of the German Government, an international seismologic conference was held at Strassburg from July 24 to 28, 1904. The official delegates represented nineteen countries in various parts of the world, Professor Reid being the delegate from the United States. As a result of this conference the International Seismological Association was formed for the purpose of cooperative earthquake investigations, and it is expected that seismologic studies will be stimulated, especially in countries which have not heretofore been active in this field.

American observers and the correspondents of the MONTHLY WEATHER REVIEW are therefore invited to send reports of earthquakes to the Director of the U. S. Geological Survey for the use of Professor Reid. It is only in exceptional cases that such articles on this subject will hereafter be published in the MONTHLY WEATHER REVIEW, as we do not wish to duplicate his publications.

The first semiannual report by Professor Reid covering the months January to June, 1904, will be found in "Terrestrial Magnetism," June, 1905, Vol. X, pages 81–96. A fuller report will probably be published as a bulletin of the U. S. Geological Survey.

We have been requested to assist in distributing the following request for careful reports:

DESIDERATA RELATIVE TO EARTHQUAKES.

The U. S. Weather Bureau usually publishes in the monthly reports of the Climate and Crop Service, notices of earthquakes which have occurred in the respective States. The value of these reports would be greatly increased if more detail were given, especially with regard to the exact time of occurrence and the intensity of the shock.

When earthquakes are reported on the same day from various localities not very distant from each other, it may happen that they refer to the same disturbance or to different disturbances. If the exact times are recorded any uncertainty can, in general, be removed. In the compilation of general lists of earthquakes for all parts of the world, it is convenient to refer them all to some one standard of time, such as Greenwich mean time, but as the days in different parts of the world begin and end at different times, this is not possible unless the time of the disturbance is known and the local standard of time is mentioned.

Earthquakes of all intensities occur from those too small to be recorded even by the most delicate instruments to those of destructive violence. When the shock is unusually strong, much detail regarding it is apt to be given for that locality, but when it is only moderate, the record frequently states merely the fact that an earthquake was felt. Now, in studying earthquakes it is important to know the intensity of the wave of shock as it spreads outward over the globe, and it is, therefore, desirable that sufficient description of the local phenomena be given to allow the intensity of the shock to be expressed according to the Rossi-Forel scale, which is given below. This scale has been generally adopted by seismologists throughout the world.

ROSSI-FOREL SCALE.

I. Recorded by a single seismograph, or by some seismographs of the same pattern, but not by several seismographs of different kinds; the shock felt by an experienced observer.

II. Recorded by seismographs of different kinds; felt by a small number of persons at rest.

III. Felt by several persons at rest; strong enough for the duration or the direction to be appreciable.

IV. Felt by persons in motion; cracking of ceilings.

V. Felt generally by every one; ringing of some bells.

VI. General awakening of those asleep; general ringing of bells, stopping of clocks; visible disturbance of trees and shrubs; some startled persons leaving their dwellings.

VII. Fall of plaster; ringing of church bells; general panic; little or no damage to buildings.

VIII. Fall of chimneys; cracks in the walls of buildings.

IX. Partial or total destruction of some buildings.

X. Great disasters; ruins; disturbance of strata; fissures in the earth's crust; rock falls from mountains.

It is best for the individual local observers to describe as accurately as possible what the earthquake did and leave it to the student who compares all records to assign the scale values to the local intensities.

THE LIBBEY CIRCLE IN SEISMOLOGY.

In the annual report for 1904, part 1, page 44, of the British Association for the Advancement of Science, Professor Milne in his report on earthquakes refers to the "Libbey Circle" and enters it upon an accompanying chart. Undoubtedly Professor Milne refers back to the meeting of the British Association for the Advancement of Science in 1902 when Prof. William Libbey, of Princeton, was present and spoke at length upon what Professor Guyot was in the habit of calling the great zone of fracture about the globe.

This circle is a small circle of the globe having Bering Strait as a center or pole and a radius of about 80° of arc. It is found that a circle thus drawn cuts through all the depressed lands in the central portion of the globe.

Professor Guyot often referred to this region as the zone of fracture and one that contained five-sixths of the active volcanoes of the world. It stands in clear contrast with the great circle of volcanoes surrounding the Pacific basin. It is, in fact, a zone because a great circle will not exactly fit all these depressions, but a zone with slightly irregular borders and with this circle as an approximate median line will do so. Professor Guyot never referred to this zone as in any way connected with seismological phenomena, but Professor Libbey spoke of this part of the subject at the British Association for the Advancement of Science in 1902 at considerable length, and reported that he had a large amount of as yet unpublished evidence of very great seismic activity within this zone.

THE PICHE EVAPOROMETER.

In answer to some inquiries as to the coefficient to be used in the reduction of observations with the Piche evaporometer, the Editor would refer inquirers to the article by Prof. Thomas Russell in the MONTHLY WEATHER REVIEW for September, 1888. As this number of the REVIEW is now entirely out of print the following summary of Professor Russell's results may be welcome.

The Piche evaporometer (see fig. 1) consists of a glass tube about nine inches long and 0.4 inch internal diameter. The top is hermetically sealed; the lower end is closed by a disk of metal and a spring which holds a disk of porous paper in place. The tube being filled with water keeps the paper disk wet with a continuous supply of water to replace whatever is evaporated. The amount of evaporation is measured by the fall of the water in the tube. The supply should be so generous that the small disk of paper is kept wet even in the driest winds.

Twenty-five of these instruments were procured for the Signal Service in 1888; most of them were carefully compared with each other by weighing and with two standard shallow dishes of water from whose surfaces evaporation took place freely. The evaporating surface of the wet paper averaged 11.2 square centimeters or 1.182 square inches. The evapora-

ting surface of each dish was 33.65 square centimeters or 3.554 square inches and the dishes were 1.3 inches in depth. Comparing equal surfaces of paper and water the Piches evaporated 1.33 times as much as the dishes when the dishes were full, but the ratio increased steadily up to 2.05 in proportion as the surface of the water in the dishes fell lower and lower. This is in accordance with all experience in evaporating water in dishes; probably the evaporation from a natural pond or reservoir diminishes in proportion as the surface of the water is below the level of the surrounding land, trees, or buildings. This diminution is due, of course, principally to the diminution of the wind at the surface of the water.

FIG. 1.

Experiments were made with different kinds of paper disks. A pad of the thickest sort of blotting paper evaporated more by 7 per cent than the thin, unsized paper furnished with the apparatus; this was apparently due principally to the additional surface exposed by the edge of the thick paper. The different Piche evaporometers agreed with each other more closely than the different dishes of water. The height of water in the tube of the Piche evaporometer or its pressure on the disk of paper made no appreciable difference in the evaporation. These comparisons were all made with apparatus installed in thermometer shelters, i. e., cubical boxes, three feet on a side, with open louvers, they therefore correspond to a very gentle movement of the wind over surfaces that are protected from the direct rays of the sun.

An anemometer set up inside the shelter gave velocities only one-half those recorded on the outside. It was found impossible to make any satisfactory allowance for the wind as recorded in the standard location of the anemometer. The average velocity of the wind for a year at all Signal Service stations was estimated to amount to about 8.5 miles per hour, and the general observations of evaporation must be considered as holding good for that velocity in the free air or one-half of that velocity in the shelter.

The effect of the wind on evaporation was determined by direct experiment, using the 28-foot whirling machine set up in the interior of the Pension Office Building, with which anemometers had been standardized. One Piche evaporometer was suspended in the adjoining quiet air, the other fixed to the outer end of the long arm of the whirling machine and driven at a given rate of motion for half an hour, when both instruments were observed by very accurate weighing instead of the less accurate scale reading. Then the two Piche evaporometers were interchanged and another similar set of observations made. The evaporation from the moving Piche was greater than that from the quiet one by the factors in the following table, which holds good for an average temperature of 83.7° F. and a relative humidity of 50 per cent:

Velocity. Miles per hour.	Factor.
0	1.0
5	2.2
10	3.8
15	4.9
20	5.7
25	6.1
30	6.3

If barometric pressure is lowered the evaporation is increased, but no opportunity was offered for repeating these whirling experiments at very low pressures and they may be assumed to hold good for a barometric reading of 30.00 inches. On the other hand the evaporation computed for 30.00 inches was reduced theoretically by Professor Russell for the effect of the low pressure at any given high station by using the ratio 30.00 inches divided by the mean pressure at the station as the barometric reducing factor.

As the amount of evaporation increases with the temperature and dryness of the air Professor Russell also reduced the observations at Washington to a theoretical value at any other station by using the additional factor

$$Ap_w + B(p_w - p_d)$$

where p_w is the vapor tension corresponding to the wet-bulb thermometer, and p_d is the vapor tension corresponding to the dew-point. Using the monthly means of observations at the eighteen stations occupied by the Signal Service the arbitrary coefficients A and B were determined so as to satisfy the whole range of observations, and Professor Russell found $A = 1.96$, $B = 43.9$.

It will be seen, therefore, that by means of the coefficient 1.33 Professor Russell passed from the Piche to the evaporation from the surface of water in dishes in shelters. By means of the tabular results of experiments with the whirling machine he passed from the wind in the shelter to the natural wind outdoors. By means of the barometric coefficient $30/b$ he passed from the lower to the higher altitudes. By the coefficients A and B he passed from the temperature and relative humidity prevailing in the shelter at Washington to the conditions prevailing at any point in the United States. Of course, however, this whole process was a series of approximations, and although it is the best that has yet been done, still it is in great need of revision.

The amount of evaporation from natural surfaces exposed to full sunshine can not be estimated even roughly from the records of observations made within instrument shelters. The latter may apply fairly well to forest areas, cloudy weather, and shaded mountain sides, but work in direct sunshine is needed in order to supplement the work done by Professor Russell. Such measurements under natural conditions have indeed been recorded by several investigators, notably Stelling, at St. Petersburg, Fitzgerald, at Boston, the Army Engineers, at Milwaukee, Wis., and more recently Carpenter, at Fort Collins, Colo. With the first of these results Professor Russell compares his own work and shows that if we assume a velocity of 3.5 miles per hour within the shelter at Boston, or 7.1 miles outside the shelter then the computed evaporation, 34.40 inches, agrees closely with the observed evaporation, 39.11, for one year. For New York the computed evaporation is 40.60 inches, the observed, at the Croton Waterworks, 39.21 inches.

For Milwaukee during three years, 1862, 1863, and 1864, but only during the warmer months of each year, observations were made by the Chief of Engineers by weighing a large shallow vessel filled with water set up inside a thermometer shelter. The mean of these three years, for the months of June to September, gave a total for these four months of 20.60 inches, the corresponding total computed by Professor Russell is 14.70, a large difference for which no explanation is offered. For the corresponding months at Chicago, in 1888, the Piche evaporometer gave 23.87 inches, and the theoretical formula for normal atmospheric conditions gave 19.60 inches.

In both cases it is likely that the normal conditions assumed by the formula differed largely from the actual conditions of the years in question. In general, therefore, although Professor Russell's formula will hold good for the moist climate of the eastern United States it may give too small values for the hot, dry climate of the interior. He estimated its accuracy as correct within 20 per cent, but added that it must be remembered that the formula and the figures given by him for all Signal Service stations represent only the possibilities of evaporation under normal conditions, and not the actual evaporation occurring from natural surfaces.

The Editor would again call attention to the principle laid down by him in discussing this subject in his Treatise on Meteorological Apparatus and Methods, viz, that evaporation as measured by any form of apparatus thus far devised corresponds to artificial conditions so far removed from nature that it can at best give only a crude representation of the actual natural evaporation by which moisture is thrown into the atmosphere from the ocean, the lakes, and the land. The true method of treating evaporometers of all kinds within instrument shelters is to consider them as integrating hygrometers. For such exposures, the total evaporation during an hour, or a day, is a simple result of the temperature, the wind, and the dryness. Knowing the two former and the measured evaporation, we may compute the average dryness. This average dryness is a much more important datum to the meteorologist than is the measured evaporation to the climatologist. Of course, hydraulic and irrigation engineers need to know the loss of water by evaporation, but in nature this is so mixed up with seepage, leakage, and consumption by animals and plants that our meteorological data are of comparatively little importance. For the agricultural engineer the lysimeter and Symon's evaporometer, six feet square, are essential apparatus, but for the meteorologist an integrating hygrometer, such as the Piche evaporometer really is, is the important instrument. The meteorologist takes the atmosphere as it is, without necessarily concerning himself as to where the moisture comes from, and then tries to follow the air and vapor in all their kaleidoscopic changes.

THE ASSOCIATIONS OF TEACHERS OF PHYSICS AND MATHEMATICS.

Under the leadership of enthusiastic teachers in the universities and colleges, the teachers in normal schools, high schools, and academies are being organized into associations for mutual improvement. Three such associations are known to the Editor, viz, the Eastern Association, meeting usually in New England; the Middle States Association, meeting usually in New York or New Jersey; and the Central Association of Science and Mathematics Teachers, meeting usually in Chicago. Probably others also exist.

In all these associations the teaching of meteorology has received more or less attention and we commend the importance of such associations to the attention of those officials of the Weather Bureau who are interested in education.

The addresses of J. W. Smith, R. DeC. Ward, and William M. Davis before the Eastern Association on Saturday, May 20, 1905, and the addresses of Prof. H. J. Cox and the Editor before the Central Association on November 24, 1904, illustrate the importance of availing ourselves of these opportunities to further the meteorological propaganda.

WEATHER BUREAU MEN AS EDUCATORS.

Mr. Alfred F. Sims, Local Forecaster, Albany, N. Y., reports a visit from the class in physical geography of St. Agnes School, to which he gave instruction in the use of Weather Bureau instruments on April 27.

Mr. J. B. Marbury, Local Forecaster, Atlanta, Ga., reports that on June 10 the office of the Weather Bureau was visited by about forty members of the local Young Men's Christian Association to whom he gave a lecture on the work of the Weather Bureau which it is believed will lead to a more general appreciation of the service.

Mr. J. W. Smith, District Forecaster, Boston, Mass., reports that on May 20 he gave an address to the Eastern Association of Physics Teachers, and on the same date he also delivered a lecture to a class from Harvard University, and on June 3 to a class from the Mechanic Arts High School. In each of these addresses he explained the organization, the work, and the beneficial results of the Weather Bureau. The lectures were given at the local Weather Bureau office.

Mr. David Cuthbertson, Local Forecaster, Buffalo, N. Y., reports that during May three classes from the public schools visited the office and received instruction in the rudiments of elementary meteorology.

Professor H. J. Cox, Chicago, Ill., under date of April 28, reports:

A committee, of which I am chairman, consisting of six members of the Geographic Society of Chicago, was recently appointed to prepare a bulletin on the teaching of meteorology, which is to be published by the society. Five members are teachers actively engaged in instruction in meteorology and physiography, among whom are Professor Goode and Mr. Barrows of the University of Chicago. It is believed that the work of the committee will afford great assistance to all engaged in teaching meteorology, and should meet with the cooperation of the Weather Bureau. It is the plan of the committee to supply lantern slides to teachers at actual cost (about $3 per dozen). The following outline shows the subjects that the committee expects to illustrate, and the person to whom each subject is entrusted:

METEOROLOGY.

1. The atmosphere.—General considerations.
   Illustrations of meteorological instruments.—Mr. Cox.
2. Temperature.
   Illustrations: Charts of isotherms and other [charts of] heat distribution.—Miss Smith.
3. Air pressure and circulation.
   Illustrations: Graphs of pressure records and wind records.
   Diagrams for vertical circulation and meridional charts of circulations.—General.
   Graphs of adiabatic vertical temperature gradient, and actual temperature gradient.
   Charts of moonsoons.—Mr. Everly.
   Weather maps of United States, etc.; cyclones, tornadoes, etc.—Mr. Cox, Mr. Goode.
   Pictures of storm destruction, etc.; thunderstorms, etc.—Mr. Cox.
4. Moisture.
   Illustrations: Graphs of moisture range.
   Cloud forms (photographs).
   Graphs of rainfall by months.
   Charts of rainfall distribution.
   Graphs on hail formation.
   Photographs of hail or damage by hail.—Mr. Wilder.
   Snow crystals, and frost scenes.
   Snowscapes; sea ice.
   Charts of humidity and evaporation.—Miss Smith.
5. Optics and electricity.
   Illustrations: Mirage, coronæ, halos, rainbows, etc.; aurora borealis; lightning.—Mr. Barrows.
6. Climate.
   Charts of United States and other regions.—Mr. Goode, Mr. Cox.

Under date of May 19 Professor Cox reports a lecture delivered May 5 before the Press Club of Chicago, and an address on May 12 before the Harmony Guild for the benefit of the charities of that organization. Both lectures were of a popular character and were highly appreciated.

Mr. W. P. Stewart, Assistant Observer, Escanaba, Mich., reports that on June 8 a class in physical geography from the Escanaba High School visited the office and were instructed in the use of instruments and maps, and methods of weather prediction.

Mr. D. S. Landis, Assistant Observer, Fort Worth, Tex., reports that during April two lectures were given to and visits received from scholars in the eighth and ninth grades in the High School.

Mr. B. L. Waldron, Observer, Hannibal, Mo., reports that the Principal with the senior class of the West School visited the Weather Bureau office on May 10 and were given a lecture on the construction and use of instruments, forecasting, and

work of the Weather Bureau. On May 27 another class from the same school visited the office, accompanied by a teacher. The same lecture was repeated, with some additional remarks on so-called long-range forecasters and their work.

Mr. S. W. Glenn, Section Director, Huron, S. Dak., reports that students of the summer school of the Huron College visited the office of the Weather Bureau on June 28 for instruction in the construction and use of the several instruments, and the work of the Bureau. The class was large and evinced much interest in the instruction. A portion of the class made another visit on July 20 for instruction of a more detailed character than was possible when the full class was present. The instructor on this occasion dealt largely with the formation, development, and progress of storms.

Mr. J. L. Bartlett, Observer, Madison, Wis., is announced in the catalogue of the University of Wisconsin (pages 176, 177) as lecturer on meteorology and offers the following courses:

1. Elementary meteorology.—The properties and phenomena of the earth's atmosphere, including barometric pressure, temperature, precipitation, fog, dew, frost, clouds, the general circulation of the atmosphere, and general and local storms. Explanation of the meteorological apparatus in use at the Weather Bureau office, and instruction in its use. Instruction and practise work in taking and recording weather observations, in preparing weather maps, and in the use of the weather maps in making forecasts and warnings. First semester; three times a week.

2. Advanced meteorology and climatology.—The climatic elements; solar or physical climate; physical climate, including continental, marine, and mountain climates; snow line and glaciers, mountain and valley winds, foehn, sirocco, bora, and mistral; mountains as climatic barriers; geological and secular changes of climate; periodic variations of climate; especial attention will be given to the study of the climate of the United States. Second semester; three times a week.

It will be seen that this course of lectures fairly covers the field of the ordinary text-books by Davis, Hann, Ward, and Waldo. But of course there is abundant opportunity for the instructor to introduce original ideas and methods such as will be expected from the instructors in such a famous and progressive university as that of Wisconsin.

Among the faculty at this university we notice the names of several who are well-known to the Weather Bureau, among them Mr. A. L. Colton, Instructor in Physics, formerly private secretary to Prof. M. W. Harrington; Mr. A. S. Flint, Astronomer, formerly aide at the U. S. Naval Observatory; Dr. C. E. Mendenhall, Associate Professor of Physics, son of Prof. T. C. Mendenhall, formerly of the Weather Bureau, and for a long time Chief of the U. S. Coast and Geodetic Survey. The University of Wisconsin is rapidly assuming a prominent position in the matter of post-graduate instruction.

Mr. T. S. Outram, Local Forecaster, Minneapolis, Minn., reports a visit on May 12 and May 17, from the classes of the Central High School. The pupils were shown how the reports from the different stations are received and entered on Map A, how forecasts are made and how the maps are prepared for printing, how the records of the different instruments are made and compiled, what the instruments are and how they are mounted, etc. Questions of the teacher and pupils were answered.

At this school the class in physical geography is being taught a good deal of practical meteorology and the pupils are constantly being instructed regarding the difference between the forecasts of unprincipled or ignorant guessers of the weather conditions of the distant future and the forecasts of those following the lines of accepted science.

Mr. Dewey A. Seeley, Observer, Peoria, Ill., located at the Meteorological Observatory of the Bradley Polytechnic Institute, reports that lectures have been given by him as follows: April 21, before the Young Men's Christian Association, May 5, before the Bradley Polytechnic, May 10, before the Men's Club of St. Paul's Episcopal Church, May 31, before the pupils of the public schools, June 16, in connection with the "Open Night" at the Bradley Polytechnic. In addition to the above the students of the institute have been instructed from time to time at the office in sections of about twenty each. At the public lectures from 200 to 500 persons have generally been present.

Mr. C. F. von Herrmann, Section Director, Raleigh, N. C., reports as follows:

I entered upon my second year as instructor in meteorology at the Agricultural and Mechanical College, West Raleigh, N. C., on January 16, 1905. Owing to the disinclination of the college authorities to purchase the required number of text-books for the larger class instructed this year, the course given by me was changed, and does not now include recitations from a text-book. Instead of this, a course of twelve lectures has been prepared, which covers the field of meteorology fairly well. The lectures comprise:

1. The atmosphere; its origin, evolution, and arrangement.
2. The physical properties of the atmosphere; sources of heat.
3. The temperature of the atmosphere.
4. The temperature of the atmosphere (continued).
5. The pressure of the air.
6. Moisture, and its condensation into cloud, etc.
7. The various forms of precipitation.
8. Winds.
9. General circulation of the atmosphere.
10. Cyclones and anticyclones.
11. Weather and local storms.
12. The work of the Weather Bureau.

The senior class in agriculture takes the course in meteorology.

The lecture hour is Thursdays from 3 to 4 p. m. Of the course outlined the first four lectures have been delivered. In order to show the nature of the course, I inclose rough drafts of the first four lectures, together with the diagrams, notes, etc., used in connection therewith. As delivered, however, the lectures have been modified in the direction of a more elementary presentation of the subject. My indebtedness to Hann's Lehrbuch der Meteorologie is plain.

Finding it difficult to prepare, by the chalk plate process, accurate copies of certain required charts—as, for instance, the isobars and winds for the globe, January, July, and the year, and others which are very much needed—I adopted the method of making photographic copies. I find this method too expensive and troublesome, where it is necessary to give each member of the class a copy. In future I shall have to endeavor to make chalk plate copies of the most important charts, so that a sufficient supply may be printed.

I would suggest that the central office could save those officials who are acting as instructors in colleges much labor by providing certain much-needed charts, the isothermal and isobaric charts for the globe, charts showing the distribution of precipitation, cloud pictures, and the like. Rather than have these charts on a large scale for wall display, they might be printed small, about the size of an octavo page, and furnished to instructors in sufficient quantities to enable a copy to be given to each student, forming a valuable nucleus for other notes taken during the course.

With regard to the four lectures referred to above by Mr. von Herrmann a commendatory letter was written by the Chief of Bureau in which he said:

You are hereby commended for the preparation of these papers. They show that their author possesses both literary and scientific talent of a high order. This commendation will be noted on your official record.

Mr. Edward H. Bowie, Local Forecaster, St. Louis, Mo., reports that Mr. L. H. Daingerfield, Observer, explained the instrumental equipment, weather map, and process of map making to a class of about forty teachers employed in the St. Louis schools but now attending the Summer Normal School.

Mr. Ford A. Carpenter, Observer, San Diego, Cal., reports an address before the San Diego Academy of Science June 10 on "San Diego weather during the season of 1904–5." On the 25th of May he delivered the last of his course of lectures on meteorology at the San Diego State Normal School.

Mr. W. H. Alexander, Observer, Taylor, Tex., having been

stationed at Taylor, Tex., in order to deliver lectures at the University of Texas, located at Austin, which is about 30 miles southwest of Taylor, reports:

I have called upon President Prather of the University of Texas. As Mr. Alexander Deussen is now giving three lessons a week in elementary meteorology it appears most feasible to let the present arrangement stand for the remainder of this college session and for me to arrange to deliver a few lectures to the students as a whole on the U. S. Weather Bureau and its work. It is believed that such lectures would be helpful as matters of general information and would serve to bring the course in meteorology more prominently before the student body.

Mr. W. S. Belden, Section Director, Vicksburg, Miss., reports that during May and June he delivered a series of five lectures before the junior and senior classes of St. Francis Xavier's Academy on the following subjects:

(1) Temperature and pressure of the atmosphere.
(2) Winds and moisture of the atmosphere.
(3) Atmospheric optics.
(4) Cyclones, anticyclones, hurricanes, and tornadoes.
(5) The weather map and weather forecasting.

The lectures were freely interspersed with experiments and illustrations.

THE NEW EDITION OF HANN'S METEOROLOGY.

The great demand for the Lehrbuch published by Hann in 1900–1901 has given occasion for the preparation and publication of a second edition, of which the first five parts have already been published by C. H. Tauchnitz, in Leipsic, Germany. So far as we have noticed, the illustrations and charts of the second edition do not differ materially from those of the first; indeed there was little occasion for a change in this respect, except in regard to the results of the more recent observations of hail and clouds, or the international work with kites and balloons in the free atmosphere. On the other hand the text shows everywhere the revising hand of the author, introducing innumerable changes in order that it may represent the latest additions to our knowledge. The historical development of observational meteorology has been given so fully in the first edition, and especially in the standard Lehrbuch by E. E. Schmidt (Jena, 1860) that Hann has rightly appreciated the fact that the great need of the present moment is a clear statement of the physics and mechanics of the atmosphere, that is to say, the problems of heat, moisture, and motion, and the rationale of the never-ending complexity of our atmospheric phenomena. Although Hann has made statistical climatology such a prominent part of his life work as to have revolutionized our knowledge of the subject, yet he has been able to devote equal attention to the underlying philosophy, and step by step has built up a systematic theory or in some cases has completed the structure that others had begun. His second edition differs from the first by the omission of many bibliographical notes in fine print and by the use of larger type for the main body of the text, it is therefore much less wearisome to the eye and it is easier to follow the trains of thought. If the preceding edition was an encyclopedia or a compilation of all that the author had read during his preceding forty years of activity, the new edition on the other hand is a digest of the present condition of our knowledge, and, therefore, especially adapted to the use of students in universities and of teachers who give special attention to meteorology.

The English speaking public has often asked for an English edition of the original German work; in fact the Editor undertook this work with a brave heart, but after a few weeks realized that we could find no publisher for it, and that in fact those who are able to use such a translation are probably also well enough acquainted with the German language to prefer the original. But as regards the present edition, which will embrace about 600 pages as compared with the 800 of the previous edition, there can be no doubt but that an English translation will be welcomed by students and teachers throughout the world. It is greatly to be hoped that by assigning each chapter to some competent student for translation the German publisher may secure the most prompt publication possible, so that this work may exercise throughout England, America, and their colonies the good influence that it is bound to exert among the German speaking peoples.

So far as published the new edition consists of an introduction of 24 pages; Book I, pages 25–125, five chapters on the temperature of the solid and fluid portions of the earth's surface and of its atmosphere; Book II, pages 126–156, four chapters on atmospheric pressure and its variability; Book III, pages 157–275, four chapters on the aqueous vapor of the atmosphere; Book IV, pages 276–362, five chapters on the movements of the atmosphere or dynamic meteorology. Book V, the disturbances of the atmosphere, or the daily weather, storms, cyclones, etc., brings us to the last page, 432, of the fifth part. This corresponds closely to page 542 of the first edition and shows approximately the ratio of condensation in the two editions. Evidently the omitted bibliographic notes in fine print have often been replaced by additions of new material. At this rate one more part will bring us to the end of the volume, at something more than 600 pages.

As the price of the new edition, unbound, will amount to about eighteen marks or $4.50 when complete, it will be quite within the means of every college library and enthusiastic teacher. Either Stechert or Lemcke and Büchner, the well-known importers in New York, N. Y., will obtain copies at the shortest notice. But, as above said, an English edition is imperative. No one can ask that another with the genius of Hann shall repeat the great labor that he has performed for the science to which his life is devoted. Rarely has any branch of science presented a similar instance of 50 years of continuous devotion of every energy of one person to the herculean task of bringing order out of chaos; throwing the light of reason upon the art of observing and studying one special line of natural phenomena. Most meteorologists, so-called, have divided their attention between that subject and some other branch of science, but Hann has from the beginning devoted himself to meteorology alone.

CONTRIBUTIONS TO THE PHYSICS OF THE FREE ATMOSPHERE.

The great extension that has been given to the use of balloons and kites in aerial research is well known to all readers of the MONTHLY WEATHER REVIEW. The work of Abercromby with the kite balloon in 1885 and 1887, Teisserenc de Bort with sounding balloons about 1887, the Weather Bureau and the Blue Hill Observatory with kites about 1894, has led this subject to be taken up by almost every nation of Europe, and it is seen to be the most important branch of atmospheric investigation. By voluntary agreement on the part of individuals and national weather bureaus certain dates have been agreed upon for simultaneous ascensions and the results of this work have been published in greatest detail at the expense of the German Government in a series of volumes known as "Veröffentlichungen," or the "Publications of the International Commission for Scientific Research by means of Balloons, Kites, Mountain Stations, and Cloud Observations." Four volumes of this character have been published for the years 1899–1903, but as it did not seem proper that Germany should bear the whole expense of the international work it has been agreed that beginning with the work of 1904 the publication shall be at the joint expense of all nations and individuals that are willing to contribute to it. Accordingly contributions and subscriptions may be sent to Prof. H. Hergesell, Strassburg, Germany, as president of the international committee.

A publication distinct from the preceding was initiated in 1904 under the title of "Beiträge," or "Contributions to the

Physics of the Free Atmosphere." This publication is especially designed to include the general investigations in this branch of meteorology as distinct from the publication of the original data of observation. Three parts of the first volume have already been published under the editorship of Professor Hergesell, and, as before, subscriptions may be addressed to him at the University of Strassburg. The contents of these three parts have already been mentioned by title in the lists of "Recent papers bearing on meteorology," published in the MONTHLY WEATHER REVIEW, but the following detailed notices may not be superfluous:

(1) *H. Hergesell.*—"Kite Ascension on Lake Constance (Boden-See)." Lake Constance lies on the confines between Germany and Switzerland and as its dimensions allow of a straight northwest and southeast course of nearly thirty miles in length with a free width of four or five miles it is one of the most convenient lakes in the world on which to acquire the necessary experience in flying kites from moving steamers. The flying of kites from vessels at sea for the purpose of carrying a life line to a lee shore has, of course, been practised for a long time, but the application of the kite and steamboat at sea to aerial research belongs to recent years. Hergesell states that his first experiments on Lake Constance were made on July 1, 1900, and were revived in 1902, continuing every month until the end of 1903, the expenses being borne mostly by the Meteorological Institute at Strassburg and afterwards by the German Empire and the Wurtemburg authorities combined. The Hargrave kites were employed; the best of steel wire of diameters 0.7, 0.8, and 0.9 millimeter was used. A reel similar to that which Professor Marvin constructed for use at Hamburg was used, but instead of winding the line by the use of a gas engine, workmen were employed at first until it was found that the highest velocity attainable, viz, one meter per second, did not suffice to protect the kite from injury when the wind died away or when the boat approached the shores of the lake, so that eventually an automobile motor of three and one-half horsepower was used and velocities up to five meters per second could then be attained. The boat from which the kite was flown had a length of about 50 feet, was driven by a fifteen horsepower gas motor, and could attain a speed of four and one-half meters per second. Evidently, therefore, in a calm or light wind the speed of the boat would not be sufficient to raise the kite; in fact it was found that in addition to this speed one must have a wind of 2.5 meters per second in order to succeed. In the latter part of the work a more powerful steamer was used which could attain a velocity of 6.7 meters per second, with which, in general, flights could be made successfully, except on days of absolute calm, on which occasions Hergesell says he resorted to the use of small captive balloons which, when held at a given altitude in the air and drawn horizontally by the movement of the boat, gave the thermograph a sufficient ventilation to attain good results. He advocates the establishment of a permanent observatory on the shore of Lake Constance, furnished with a boat, kites, and balloons in order to accomplish daily soundings in the free atmosphere. As to the actual observations made on Lake Constance, he gives the results of 34 kite ascensions during June-December, 1903; the previous ascents having already been published in the "Veröffentlichungen."

The highest kite ascent seems to have attained 2710 meters, so that there can be no doubt that this method of raising kites in calm weather is an important addition to our methods of research in meteorology, and is applicable not only on a long stretch of river or lake, but peculiarly so on any short line of railroad that may be available. In fact, the meteorologist who owns a first-class automobile may thus become independent of the wind, and of location as to land and water, and be able to explore the atmosphere in regions where, and at hours when it has hitherto been impracticable to use kites.

(2) *R. Assmann.*—"A Year of Simultaneous Kite Ascensions at Berlin and Hamburg." From a study of the work at these two stations almost daily from May, 1903, to April, 1904, the author draws many important conclusions. As inversions of temperature have occurred more frequently than European meteorologists anticipated [although by no means unexpected to those acquainted with American weather maps and climate.—ED.] the author enumerates them, and finds that 50 per cent of the ascensions from Berlin and about 38 per cent of the observations over Hamburg during the year revealed inversions, or uniformity, of temperature over the respective cities. The inversions were most frequent in November to March, and least frequent in the months May to August. The average altitude at which the inversions took place was rather higher in summer than in winter, and on the average of the year was 932 meters at Hamburg and 775 at Berlin. The occurrence of the inversions was most frequent when the areas of highest pressure were north and east of the stations or when the lowest pressures were south and west of the stations. The intensities of the inversions at both stations were parallel to each other, that is to say, the largest inversions in general occurred simultaneously at both stations. In general, it appeared that the wind brought the conditions favorable to inversion, and that therefore we have only to trace the air backward along the path of the wind in order to find the origin of the heat that is the prominent feature of the phenomenon of inversion. Following up this idea, the author discovered that he was almost invariably led backward on the path of the wind to a region of low temperature, instead of high temperature, and that his research could not be successful unless he studied, not the lowest, but the intermediate currents of air, lying between 500 and 1500 meters in altitude, a study that must be left to the near future. Having already suggested the possibility that the inversions occurring at considerable altitudes are due to heat given out at great distances by condensation of vapor taking place in air that subsequently floats over the station, Assmann finds the present investigation confirms this suggestion since the above-mentioned distribution of pressure implies a system of winds bringing moist air from distant lakes and oceans and from regions of rainfall.

(3) *A. de Quervain.*—"On the Determination of the Path of a Sounding Balloon during the International Ascension of July 2, 1903, from Strassburg." This is the first complete determination of the path of a small balloon up to its greatest height of 15,000 meters. In order to accomplish this, de Quervain used a theodolite whose telescope had a magnifying power of about sixteen times, a field of view of 1° 20′ diameter, and an object glass 42 mm. in diameter, such as is sold by Bosch in Strassburg for such purposes at a price of about $60. One observer remained continuously at the eyepiece of the telescope, since the balloon must be followed continuously for fear of some sudden change in its direction. This is quite wearisome to the eye but one accustomed to astronomical observation understands how to rest the eye. Whenever this observer had adjusted the cross wires in the field of view so as to precisely cover the balloon he gave the order "Attention, read," and then a second assistant read the azimuth circle and the time, while a third assistant read the altitude circle. In this way the readings required only a few seconds, the balloon was never lost sight of, and 120 positions were noted within the first two hours after which the balloon became invisible in the vapors near the horizon. The angular readings being plotted on a large scale afforded fixed points in the path of the balloon, between which the details were filled in with the meteorograph record. The horizontal projection of the path showed that up to 15,000 meters the air was very quiet with a gentle movement southward above 5000 meters, but a northward movement below that. Of course, as the balloon could not be followed to the very end

of its path, especially after it burst and fell, this method of observation does not help one much in searching for the place of descent of a balloon, but as a means of determining the horizontal movement of the air it is an invaluable addition to our knowledge since the ordinary, simple pressure and temperature records tell us nothing of this.

(4) *J. Maurer.*—"Experimental Investigation into the Coefficient of Sensitiveness or [Coefficient of Sluggishness] of Ventilated Thermometers for Various Pressures or Densities of the Air." As was well shown by Marvin, MONTHLY WEATHER REVIEW for October, 1899, the records of kite and balloon thermographs must be interpreted after a careful consideration of our knowledge of the rapidity with which the instrument responds to a change of temperature. In fact the sensitiveness of thermometers was first investigated experimentally by Poisson and an analogous investigation, in 1865, by the Editor will be found quoted in his "Treatise on Meteorological Apparatus and Methods;" it was also attended to in our balloon work of 1882–1885, but the vital importance of this subject to modern meteorology was perhaps not generally appreciated until the introduction of meteorographs, carried up rapidly by kites and balloons, since 1893. Doctor Maurer established his thermometers, or other temperature apparatus in tubes, through which a stream of air could flow at any given temperature, pressure, or velocity, and he was able to show that under these conditions the coefficient of sluggishness for a given constant velocity of wind increases very slowly as the pressure or density of the air diminishes to 400 mm., and then more rapidly until 60 or 80 mm.; it is nearly double its value at 726 mm. For different thermometers, spherical, cylindrical, and tubular, the value varies considerably. For all forms of self-registering thermometers the values are larger than for ordinary thermometers. The sluggishness varies with the kind of gas that is used, being least with hydrogen gas, whose coefficient of conduction is very large. A proper appreciation of the effect of sluggishness is necessary before we can understand whether the relatively high temperatures recorded by Assmann and Teisserenc de Bort at altitudes of 10 to 15 kilometers belong to the atmosphere or have their origin in the thermograph itself.

(5) *A. Sprung.*—"Photograph of a Rare Form of Cloud." The author gives a photographic print of a cloud seen May 25, 1904, at Potsdam, and the perfection of this print should stimulate other meteorologists to do as well. The cloud itself appeared at first as rain falling from an alto-cumulus, but the author seems to class it as a case of false cirrus formed from an alto-cumulus.

(6) *A. de Quervain.*—"Tables for the Barometric Computation of Altitudes." Both Angot and Rykatchef long since demonstrated that when barometric observations are made with sufficient accuracy the correspondingly accurate computation of altitudes can only be carried out by dividing the intervening air into layers, within which the gradients of temperature, moisture, and pressure, and for that matter also motion, follow some simple law. In other words, the atmosphere consists of a series of layers each of which is governed by special considerations, so that it will not do to assume average temperatures, moistures, etc., for the whole mass. The barometric formulæ and the tables for their use were first given with sufficient elaboration by Angot in the Memoirs of the Central Meteorological Bureau at Paris for 1896. Quervain has reprinted these with some modifications and extensions, adapting them to such pressures and temperatures as are likely to be met with in work with sounding balloons, viz, down to 20 mm. of pressure, and —60° C. He has also introduced the latest constant for the density of the air at the earth's surface as composed of nitrogen, oxygen, argon, and carbonic acid gas, but even this will evidently need reconsideration whenever in any special case the specific local and temporary constitution of the air can be determined. After all, however, accuracy in barometric hypsometry depends essentially upon our knowledge of the temperature of the air, and our determination of the existence or nonexistence of an inversion of temperature.

(7) "Proceedings of the Conference of the International Committee for Scientific Aerial Research at St. Petersburg in September, 1904." See MONTHLY WEATHER REVIEW, February, 1905, page 59.

(8) *H. H. Clayton.*—"Various Researches on the Temperature in Cyclones and Anticyclones in Temperate Latitudes." The author reviews the literature of the past 30 years developing the idea that areas of low pressure are regions of relative cold, and areas of high pressure regions of relative warmth; which ideas are the opposites of those that had been uniformly maintained before the establishment of mountain observatories and kite and balloon work. Doubt as to the correctness of the older ideas was perhaps first awakened in Germany by Professor Hann's discussion, in 1876, of observations on mountain peaks, and he started the idea that areas of high pressure had a dynamic origin, and were not due entirely to the cold of the lower strata and the consequent overflow of the upper air Since those days, the discussion as to the thermal origin and the dynamic origin of areas of high pressure has been kept up by Hann, Dechevrens, and Hazen, although it might well be recognized that both causes are operative and that the important question is as to which is the prevailing influence in any special case. Mr. Clayton says that up to 1904 the investigations of Hann, Dechevrens, Berson, and Teisserenc de Bort lead to the conclusion that below nine kilometers cyclones average colder than anticyclones, while the investigations of Harrington, Hazen, Rotch, Shaw, Dines, and himself lead to the conclusion that cyclones average warmer than anticyclones. These facts appear to indicate a direct contradiction, yet it may be, as in the case of the different results obtained by Espy and Redfield in regard to the wind movement in cyclones, that both are partly right.

On comparing the results by the two sets of investigations, one difference stands out distinctly. Those investigators who have found that the cyclone is colder than the anticyclone have considered the temperature in relation to pressure without regard to time, while the investigators who have found that the cyclone is warmer, have, with the exception of Mr. Rotch, considered the temperature with relation to the time of maxima and minima of pressure. Why these two methods should lead to different results it is difficult to see, although there may be a reason. Finally Mr. Clayton says:

> The cold-air cyclone of the upper air and the warm-air cyclone of the lower air are not necessarily connected, but both influence the surface pressure and both probably usually exist simultaneously in temperate zones within a few hundred kilometers of each other, and may form part of one system. Heretofore, in the convectional theories of cyclones the warm-air surface cyclone has been fully considered, but the upper-air cold cyclone has been neglected. These cold cyclones are usually secondaries, or V-shaped depressions circulating around the polar cold-air cyclone.

In order to explain the results of observations at Blue Hill Mr. Clayton states that he has adopted the hypothesis that there are two causes for areas of low pressure in the atmosphere: (1) an area of cold which contracts the air and tends to cause cyclonic circulation in the upper air, and (2) an area of warmth which expands the air and tends to cause cyclonic circulations in the lower air. In the first case the air tends to become denser and increase the pressure near the earth's surface, but the centrifugal force acting on the circulating upper air, to an unlimited extent, counteracts this effect. In the second case the upward expansion of the air tends to increase the pressure aloft, but to a limited extent, this is counteracted by the circulating air below.

(9) *H. Hergesell and E. Kleinschmidt.*—"On the Compensation of Aneroid Barometers for the Influence of Temperature."

As this is one of the most important and most difficult problems in observational meteorology it must continue to demand special attention by manufacturers, inventors, theoretical and experimental physicists, since numerous questions must be considered, and it will be a long time before highly accurate results can be obtained. As the authors say, the measurements of atmospheric pressure in sounding balloons make demands upon the aneroid barometer such as have never before been considered. The aneroid box must be free from errors over a range of more than 700 mm. in pressure and 80° C. in temperature, it must also be equally accurate for the most rapid and for the slowest changes. The present investigation considers only the influence of the temperature on the Bourdon pressure tube, with regard to which the authors state that no such tube has yet attained an absolute compensation, they also show that the ordinary method of compensation which was supposed to hold good for a pressure of 760 mm. is the worst possible for the barograph of a sounding balloon, as it introduces the largest errors at great altitudes. The special Bourdon tube, prepared by the authors' method for aerial research and especially adapted to balloon work, seems to reduce the error of compensation to a minimum. The authors also give a method of determining the correction to such a tube for any given pressure and temperature. Many of the tubes investigated by them showed during the first few months after manufacture very large changes in their indications, so that none should be used that have not had time to show their invariability.

(10) *K. Wegener.*—"A Study of the Simultaneous Kite Ascensions in Berlin, Germany, and Hald, Jutland, from the Summer of 1902 to the Spring of 1903." The station Hald is 530 kilometers northwest of Berlin and near Viborg. The observations at that place were made by a Franco-Scandinavian expedition conducted by Teisserenc de Bort, and the results of it are published in full by him. At the same time the Aeronautic Observatory of the Royal Prussian Institute began regular daily work at Berlin. This present study of the work at Berlin and Hald presents many features analogous to the study by Assmann of the observations at Berlin and Hamburg above summarized. Wegener finds a maximum number of inversions in the winter time, and for east winds, and for calms. The inversion layer was generally higher above Berlin than above Hald, and higher at both places in summer than in winter. The intensity of the inversion was greater above Berlin than Viborg, and greater in winter than in summer. The largest inversions occurred with southeast winds above Berlin, and with east winds above Hald. The statistical material seems to show a great horizontal extension of the inversion layer. In general, the velocity of the wind at every altitude was greater above Hald than above Berlin, or in other words, the retardation of the lowest stratum of air was greater at Berlin than at Hald. The greatest increase in velocity of the wind occurred between sea level and 500 meters; above this elevation at Hald there was a diminution of velocity, so that the average increase of wind velocity with altitude was less at Hald than at Berlin. The variation of wind direction with altitude was greatest in the lowest stratum and greater over Hald than above Berlin, but in the stratum between 500 and 1000 meters above Hald the change of the wind was in the opposite direction. Cases of great dryness of the air were more frequent over Berlin than over Hald. The average monthly changes of temperature were more uniform at 1000 meters above Hald, and the monthly range was less. The nearly circular area of low pressure of October 16, 1902, which belonged to those specially studied by von Bezold as so-called "centriert" depressions, or those from which air must be flowing outward at some special level above the ground was specially studied by Wegener, who found that the critical altitude in this case was 1100 meters, and that above this limit the air must be flowing outward, against the barometric pressure gradient.

(11) *H. Hergesell.*—"New Observations on the Meteorological Conditions of the Upper Warm Stratum of Air." This paper discusses especially the balloon ascension from Strassburg on the 9th of February, 1905, when an altitude of 15,080 meters was attained. The remarkably warm layer of air previously described by Assmann and Teisserenc de Bort as a result of their numerous voyages, as existing at and above eleven kilometers, but for the existence of which no satisfactory reason has yet been given, was again certainly met with on this occasion at an altitude of 11,400 meters, or about 30 minutes after the balloon had left the ground. Up to that point the ascending balloon had recorded a nearly regular adiabatic diminution of temperature which, however, now suddenly changed to an increase, although the rate of increase diminished with farther ascent. The same phenomena were observed in reverse order as the balloon fell, and it attained the lower limit of the warm stratum at 11,300 meters; the difference between the ascending and descending determinations is, therefore, only 100 meters and may have been largely due to the sluggishness of the thermograph. As soon as the rising balloon entered the warm layer it suddenly changed the direction and increased the velocity of its motion, so that the layer of warm air represented an entirely different current, whose azimuthal direction was 130° different from that of the lower one.

This summary of the first eleven articles in the Beiträge will suffice to show the nature of the problems presented by the new meteorology, and the solid physical basis on which the investigations are to be conducted; the periodical itself is bound to become a leading publication in physical meteorology.

HAILSTORM IN THE BAHAMAS.

A newspaper clipping from Miama, Fla., states that about April 18 the island of Spanish Wells, in the Bahamas 50 miles west of Nassau, was visited by a deluge of rain changing to hail. The hailstones ranged from one-fourth to one inch in diameter. This continued for several minutes until the ice was banked for several inches on the ground. Of course great damage was done to the crops. The residents of the Bahamas state that hailstorms were unknown but this present phenomenal fall is confirmed by several witnesses, indeed some state that the roofs of houses were covered six inches deep. A driving wind occurred during the hail.

We have held back this item until receiving confirmation from the cable operator at Nassau. The fall must have been very local as no hail was reported from any other island.

NO CHANGE OF CLIMATE.

The daily press is the great educator of the country and the MONTHLY WEATHER REVIEW hopes in a modest way to emulate its example. When we find popular errors that have permeated the human mind for centuries repeated and taught as it were *ex cathedra* by numerous newspaper correspondents we can but hope that these same papers will give to the public the best results of recent careful study, as in the following case:

In a syndicate letter of July 5, a special correspondent, Mr. William E. Curtis, shows that the western limit of the Kansas wheat belt has been pushed westward from the one hundredth meridian to the one hundred and second meridian, or about 100 miles without special irrigation and without any change in climate. He states that the extreme limits of cultivation have been as follows: in 1860, Emporia, 110 miles west of the Missouri State line; in 1870, Manhattan; in 1880, Salina, 286 miles west of the State line of Missouri; about 1890 there were "seven lean years" and many farms were abandoned, but

in 1896 there was plenty of rain and sunshine and the westward march was resumed; in 1900 Ellis County was the limit, but now the plowman has crossed the boundary of Colorado.

Mr. Curtis adds that there are many theories in regard to the increase of rainfall in Kansas. The popular impression is that the plowing of the ground increases the evaporation and therefore increases the precipitation, but as he very properly states there is nothing to prove that there has really been any increase of rainfall. The records cover too short a period and are neither accurate nor complete. The comparison of the records shows great variations but no increase, the greatest precipitation is in Greenwood County and the least at Dodge City in Ford County. In the extreme northwestern corner of the State, in Wallace County, the records for the past twelve years show some good rainy seasons and some dry years. We quite agree with the author when he says that:

"It is useless for anyone to assert that the cultivation of the soil has increased the rainfall."

On the other hand, there have been some remarkable changes; 25 years ago nothing would grow at Dodge City, where the soldiers at the military post tried in vain to make a garden. But the experiments were repeated from year to year, each time with better success, until now very fair crops are harvested. In 1867 old Fort Hays was the center of the Great American Desert, and to have imported a plow or a sickle would have been a matter of public ridicule. Now it is within the richest part of the grain belt. At Winona, within 40 miles of the border of Colorado, it was supposed that nothing but buffalo grass would grow, but within five or ten years dry farms have been cultivated and profitable crops harvested, and now several train loads of wheat are shipped annually. In fact, there is very little land left in Kansas that has not been taken up by farmers.

There can be no doubt but that the successful settlement and agriculture of Kansas are due primarily to the natural necessity that is imposed upon intelligent man of learning how to overcome the difficulties of his situation. It is not the increase of rainfall or the change in climate that has made Kansas habitable any more than it is the diminution of rainfall that has made Syria a desert. In the one case intelligent man has conquered the desert, in the other case ignorant men and oppressive rulers have allowed the desert climate to conquer them. As a rule, even without artificial irrigation, a good crop plant, such as wheat or maize, suitable to desert conditions can be evolved by a proper system of selection; when irrigation comes in to help, the sunny desert becomes a more profitable garden field than the moist climate of the seashore or the Tropics. As a rule, grain crops require plenty of sunshine, a soil of the right physical properties, and a very careful, systematic application of water. Formerly, the ideal wheat fields were in Egypt, with abundance of sunshine, a fine soil for retaining the water, and a periodic inundation and irrigation, regulated by the river Nile. Almost the same conditions prevail throughout the basins of the Mississippi, Missouri, Saskatchewan, and Mackenzie. The fertility of this great region is a matter that depends wholly on human industry, and not on any change of climate.

EXPLORATIONS OF THE UPPER ATMOSPHERE BY THE BLUE HILL OBSERVATORY.

Referring to the MONTHLY WEATHER REVIEW for November, 1904, page 521, and May, 1905, page 209, we find some additional interesting information in Science for July 14, 1905, from which we quote the following:

During the months of January, February, and March, 1905, nine more ascents were made at St. Louis; every balloon but one was found and, with the attached instrument, was returned to Blue Hill in accordance with the instructions on each. Like the previous balloons all of these fell within the eastern half of a circle having its center at St. Louis and a radius of 285 miles.

On January 25, when a high barometric pressure prevailed at the ground, a temperature of -111° F. (-80° C.) was recorded at a height of 48,700 feet, this being one of the lowest natural temperatures ever observed. The experiments last winter were conducted by Mr. Clayton, under the direction of Mr. Rotch, and their success induced Professor Langley, Secretary of the Smithsonian Institution, to grant Mr. Rotch $1000 from the Hodgkins Fund, in order to continue the experiments this summer at St. Louis. These, like the first, will be conducted by Mr. Fergusson, of the Blue Hill Observatory staff. Soundings of the atmosphere made at different seasons should reveal the annual variation of temperature at great heights above the American Continent, which is at present unknown.

The above-mentioned low temperature is lower than any that has hitherto been recorded in the highest balloon ascensions in Europe up to altitudes far greater than were attained in America, and emphasizes the fact that when balloon work is carried on as extensively as it ought to be by American meteorologists the conditions over our interior valley will be found to be extreme in the highest degree.

The lesson to be learned from this observation is the fact that in an area of high pressure with very cold air at the surface of the ground we also have very cold air at great altitudes and yet that same upper air at the altitude of 48,700 feet when brought down to the surface of the ground ought by compression to attain a temperature of considerably above 100° F. The difference between this high temperature and the one actually observed at the surface of the ground on January 25 (which, according to the daily weather map, was 20° F. as a minimum on January 25, and 12° F. as a minimum on January 26) must be accounted for almost wholly by the radiation of heat from the air in course of its slow descent from a height of 48,700 feet to the ground. This slow descent of air, giving time for the cooling effect, cooperates with a slow horizontal movement of the still colder air from the north. The air within our areas of high pressure must have a general slow descending motion from the north southward correlated with an ascent of warm, moist air from the surface as has so often been explained in the MONTHLY WEATHER REVIEW.

The inversion of temperature which is a widespread and almost normal phenomenon somewhere between the altitudes of 5000 and 30,000 feet must, we think, be attributed to the fact that some layer of cloud having dropped its rain and having also intercepted the sunlight has for both these reasons acquired an extra quantity of heat that can only be slowly lost by radiation.

AN OLD REFERENCE TO THE KITE IN METEOROLOGY.

Speaking of the winds Louis Cotte[1] says:

Even the children have made the wind contribute to their amusement, since it is by means of the mechanism similar to that of the sails of a wind-mill that they have found out how to force it to raise up a species of frame work covered with paper which they call *Cervolans*. The cord with which they hold this framework is always attached to it in such a way that the plane of the framework presents itself obliquely to the direction of the wind, and thus the impulse of the air tends continually to make it rise by describing the arc of a circle which has for its radius the twine which they hold in their hands.[2]

WINDS AND WAVES.

A wave progressing over deep water does not travel alone; waves always occur in groups. The center of the group is the largest or principal wave. It is preceded and followed by a series of gradually diminishing waves. The smaller waves advance more slowly than do the larger ones. The central, biggest wave is continually overtaking and swallowing up smaller waves in front of it while at the same time starting

[1] L. Cotte, Traite de la Meteorologie, Paris, 1774. Page 304.
[2] Essais de Physique de Musschenbroek, tome II, page 912.
Lecons de Physique de M. L'Abbé Nollet, tome III, page 500.

new ones far in front of them; it is also running ahead of the small waves behind it and leaving them to die away. The average velocity of the whole group of waves is therefore smaller than the velocity of the central or principal wave. This is true of gravity waves on the surface of the water no matter whether they start by a sudden impulse as an ocean earthquake wave or are maintained by the wind as an ordinary storm wave. The ordinary earthquake wave is not a gravity wave but one of compression and dilatation, or an elastic wave passing through a medium that is not homogeneous but has in general three axes of elasticity, and therefore behaves in a manner analogous to the action of many crystals on a beam of light.

With regard to the storm waves, a committee of the British Association for the Advancement of Science, of which Dr. Vaughn Cornish is secretary, publishes the following paragraph, on page 313 of the report for 1903:

ON THE SIZE OF WAVES AS RELATED TO THE RATE OF ADVANCE OF A CYCLONE.

The greatest waves will be developed in that part of the cyclone in which the direction of the wind coincides with the direction of advance of the cyclone, and I wish to call attention to the fact that, along this line of action, of all the waves which the velocity of the wind is capable of increasing, that length will enjoy superior opportunities for growth *whose group velocity is equal to the rate of advance of the cyclone*, the storm either outrunning or lagging behind the transmission of energy in waves of any other length. The velocity of the group in deep water is half the velocity of the individual waves.

It was pointed out in the last report that the period of the longest recorded swells corresponds to a wave velocity about equal to that of the greatest recorded hourly velocity of the wind (the velocity of the dominant wave in storms being much lower).

It may be added that no records of swells have been met with having periods approaching those appropriate to a deep sea velocity equal to that attained during the gusts of a storm.

Mathematical investigations have pointed to a tendency of the wind finally to produce steep waves of velocity equal, or almost equal, to that of the wind. When, however, we come to compare the observed velocities of wind, the observed dimensions of cyclonic storms, and the lengths of waves of velocity equal, or nearly equal, to that of the strongest winds, we find that we rapidly approach a condition of things when the stretch of water subject at any one time to such wind is only a small multiple of the wave length; a condition in which steep waves could not be maintained.

DIURNAL VARIATION OF ATMOSPHERIC HUMIDITY.

It is so rare that observers have the patience to make frequent observations of dew-point, relative humidity, or vapor tension, and it is so difficult to maintain correct self-registering apparatus for this important fundamental datum, that our knowledge of the diurnal variation of atmospheric vapor is far less satisfactory than our knowledge of the variations of pressure and temperature. We may therefore call attention to two series of observations, the results of which are published in the Annuaire of the Meteorological Society of France for April and May, 1905. The first series is that made by Dechevrens on the island of Jersey, where the diurnal variation apparently differs decidedly from that observed at most other maritime or littoral stations. With reference to this series Angot says that at Paris the vapor tension has in January only a single diurnal maximum and minimum, while in July it has a double diurnal oscillation, and he adds that this double diurnal oscillation in the summer time belongs to relatively low stations, where the diurnal variation of temperature is quite large; but at sea and in the neighborhood of coasts and on the summits of mountains we find at all seasons of the year only a single oscillation like that of the winter season at Paris, having only a single minimum and a single maximum. Dechevrens states that the island of Jersey is an exception to this rule at all seasons of the year. Eight observations daily of the tension of aqueous vapor made during the two months January and July, during the ten years 1894–1903, gave him the following values of the hourly departures from the general average of the respective months, which were 5.667 for January and 11.004 for July.

TABLE 1.—*Diurnal periodicity of vapor pressure at Jersey.*

Hour.	January.	July.	Hour.	January.	July.
	mm.	*mm.*		*mm.*	*mm.*
Midnight	+0.027	+0.068	Noon	−0.002	+0.006
1 a. m	+0.018	−0.014	1 p. m	−0.020	−0.026
2 a. m	+0.005	−0.069	2 p. m	−0.007	−0.094
3 a. m	+0.004	−0.121	3 p. m	+0.014	−0.145
4 a. m	−0.012	−0.105	4 p. m	+0.035	−0.169
5 a. m	−0.028	−0.049	5 p. m	+0.023	−0.149
6 a. m	−0.039	+0.062	6 p. m	+0.003	−0.072
7 a. m	−0.037	+0.116	7 p. m	−0.023	+0.008
8 a. m	−0.014	+0.139	8 p. m	−0.023	+0.061
9 a. m	+0.010	+0.104	9 p. m	−0.009	+0.100
10 a. m	+0.028	+0.061	10 p. m	+0.014	+0.118
11 a. m	+0.019	+0.053	11 p. m	+0.026	+0.118

In the Annuaire for May, 1905, M. Th. Moureaux gives a summary of the observations of atmospheric moisture at the observatory at Parc St. Maur during the 30 years, 1874–1903. From his tables we quote the following general results as to the secular variations and the annual and diurnal periodicities:

TABLE 2.—*Annual mean values of atmospheric moisture at Parc St. Maur.*

Year.	Relative humidity.	Vapor pressure.	Year.	Relative humidity.	Vapor pressure.
	Per cent.	*mm.*		*Per cent.*	*mm.*
1874	78.1	7.49	1890	78.7	7.31
1875	79.3	7.72	1891	79.1	7.41
1876	78.8	7.75	1892	76.2	7.26
1877	80.8	7.85	1893	74.4	7.38
1878	82.3	7.96	1894	77.9	7.60
1879	84.2	7.47	1895	77.1	7.42
1880	78.6	7.76	1896	78.3	7.31
1881	78.7	7.37	1897	80.0	7.96
1882	81.2	7.69	1898	79.8	7.88
1883	79.2	7.46	1899	74.8	7.49
1884	79.1	7.70	1900	75.6	7.63
1885	77.2	7.13	1901	75.8	7.22
1886	79.4	7.86	1902	78.8	7.44
1887	78.8	6.97	1903	77.9	7.52
1888	80.7	7.26			
1889	79.9	7.47	Mean	78.7	7.53

TABLE 3.—*Normal annual periodicity of moisture at Parc St. Maur.*

Month.	Relative humidity.	Vapor pressure.	Month.	Relative humidity.	Vapor pressure.
	Per cent.	*mm.*		*Per cent.*	*mm.*
January	87.2	4.90	August	74.3	10.97
February	82.7	5.07	September	80.5	10.04
March	74.8	5.30	October	85.2	7.83
April	69.1	6.11	November	86.8	6.32
May	69.9	7.64	December	88.6	5.12
June	72.7	10.03			
July	72.5	10.97	Year	78.7	7.53

TABLE 4.—*Diurnal periodicity of moisture as shown by the average departures from the annual mean at Parc St. Maur.*

Hour.	Relative humidity.	Vapor pressure.	Hour.	Relative humidity.	Vapor pressure.
	Per cent.	*mm.*		*Per cent.*	*mm.*
1 a. m	+10.0	− 0.06	1 p. m	−15.0	+ 0.02
2 a. m	+11.0	− 0.12	2 p. m	−16.0	− 0.02
3 a. m	+11.8	− 0.19	3 p. m	−15.7	− 0.06
4 a. m	+12.5	− 0.26	4 p. m	−14.0	− 0.04
5 a. m	+12.6	− 0.28	5 p. m	−10.9	0.00
6 a. m	+11.3	− 0.22	6 p. m	− 6.9	+ 0.09
7 a. m	+ 8.6	− 0.09	7 p. m	− 2.5	+ 0.19
8 a. m	+ 4.5	+ 0.04	8 p. m	+ 1.1	+ 0.20
9 a. m	− 9.5	+ 0.13	9 p. m	+ 3.7	+ 0.17
10 a. m	− 5.4	+ 0.15	10 p. m	+ 5.8	+ 0.11
11 a. m	− 9.5	+ 0.11	11 p. m	+ 7.4	+ 0.06
Noon	−12.8	+ 0.06	Midnight	+ 8.9	0.00

In addition to the elaborate tables, of which we have given only the monthly means, Moureaux gives some very interesting data relative to the extreme values. Thus the relative humidity was as low as 8 per cent on the 27th of March, 1899; 10 per cent on March 30, 1893; 11 per cent on April 1, 1892, April 24, 1893, April 2, 1894, and April 14, 1898; 12 per cent on August 18, 1892, February 26 and 27, 1899, and April 21, 1901.

It is evident, therefore, that very low relative humidities occur principally in April and occasionally in February and March. Saturated air occurs mostly in the cold season, with a maximum of 28 days during December, 1879. The monthly means of relative humidity attain their maximum, 84.2, in 1879 and the minimum, 74.4, in 1893. The maximum humidity occurs in December and diminishes continually until April. The year 1879 was remarkable as having seven months during which the humidity was the maximum on record. The lowest monthly mean was 51.6 during the great drought of April, 1893.

THE GUANGO, OR RAIN TREE.

Mr. Fred. Turner, Fellow of the Linnean Society, communicates to the Daily Telegraph, Sydney, N. S. W., of May 27, a short article on the rain tree, or guango, of Australia. He says that during the past 30 years few trees have received more attention than this from both scientific and practical men. At one time and another, writers have recommended its extensive cultivation in the drier parts of the world in order to provide moisture and make the desert blossom as the rose. Its botanical name is *Pithecolobium saman*, Benth.; it is indigenous to Brazil and Central America, but is now raised successfully in many other regions, and is a beautiful umbrageous tree of remarkably quick growth. Mr. Turner states that he has raised more than 300 seedlings in the Botanic Gardens of Brisbane, Queensland. As the latitude of Brisbane is about 27° 30′ S., on the northeast coast of Australia, it would seem, at first thought, as though this tree would flourish in the analogous climates that we have on the southeast coast of the United States, especially the coasts of Georgia, Florida, and Texas, but Mr. David Fairchild, of the Bureau of Plant Industry, states that several experiments at introduction have not met with decided success. Turner states that he has planted the guango in various soils and situations and they made remarkable growth during the summer months, especially after the January rains, but the leaves fell off at the approach of winter and the plants died down to within two inches of the ground. Southern Queensland was too cold, but northern Queensland, corresponding to our Florida, was fairly well adapted. The fruit consists of four to eight seeds, embedded in a saccharine pulpy matter very pleasant to the taste; the mature seed pods are largely used as feed for stock. They are of a light brown color, about a quarter of an inch thick, and from six to ten inches long.

Of course the readers of the REVIEW do not need to be told that trees will not provide moisture or bring rain, but on the one hand such trees as the guango may be helpful in draining wet lands, and, on the other hand, the cool, moist air settling down from their leaves during the nighttime may provide a local condition that will make it possible for certain plants to grow in their neighborhood, that would otherwise be killed by the heat and the dry air.

THE WEATHER OF THE MONTH.

By Mr. WM. B. STOCKMAN, Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and V.

The mean pressure for the month was high generally east of the Mississippi River, except in the greater part of New England and northern New York, with values ranging from 29.95 to 29.99 inches; it was also high on the north Pacific coast where the values ranged from 29.95 to 30.07 inches, the crest overlying the mouth of the Columbia River. The mean pressure for the month was low over the southern and middle Plateau and the western portions of the southern and middle slope regions, the minimum values, ranging from 29.71 to 29.75 inches, being reported from Arizona and southern Utah.

The mean pressure for the month was above the normal in extreme western Texas and southeastern New Mexico, and, as a rule, along the northern border from Lake Huron westward to the Pacific coast; elsewhere the pressure was below the average. Positive departures ranging from + .05 to + .07 inch occurred in western South Dakota and southeastern Montana; negative departures ranging from — .05 to — .08 inch occurred in southern Florida, west-central Colorado, Utah, and north-central California.

The mean pressure increased from that of May, 1905, in the Mississippi, lower Missouri, and Rio Grande valleys, and the southern slope and north Pacific regions; elsewhere the mean pressure decreased. As a rule the increases were slight, the greatest, + .06 inch, occurring in central Texas, while over eastern Montana, northern Utah, interior California generally, and southwestern Arizona, the decreases ranged from — .05 to — .10 inch.

TEMPERATURE OF THE AIR.

The mean temperature for the month was below normal in New England, Middle Atlantic States, Lake region generally, North Dakota, northern slope and northern Plateau regions, the western portions of the middle and southern Plateau regions, the Pacific districts, along the south Atlantic coast, and extreme southern Florida; elsewhere it was above the normal.

The greatest negative departures ranged from —4.0° to —5.0° and occurred over central New England, western North Dakota, and southwestern Idaho. The greatest positive departures ranged from + 2.0° to + 2.8° and occurred over northwestern Arkansas, western Missouri, southern Kansas, Oklahoma, and southeastern Colorado.

The temperature was 10°, or more, below the normal generally over New England on the 7th, 8th, 20th, 21st, and 27th; over the lower Lake region on the 27th; upper Lake region on the 26th and 27th; over the northern portion of the Missouri Valley on the 18th, 21st, 22d, 24th, 25th, and 26th, and over the central portion on the 27th; northern slope, 16th, 17th, 18th, 23d, 24th, and 25th; North Dakota, 10th, and 15–24th, inclusive; and northern Plateau, 27th. The temperature was 10°, or more, above the normal generally over the lower Lake region on the 18th; upper Mississippi Valley, 4th and 5th; Missouri Valley, 3d, 4th, and 5th; northern slope, 1st, 2d, and 3d; North Dakota, 2d, 3d, and 4th; and middle slope, 3d, 4th, and 5th.

The mean temperature for the month was as low as any June since the establishment of the station at Flagstaff, Ariz., Independence and San Francisco, Cal.; 1° lower than any June recorded at Eastport, Me., and Modena, Utah; and 3° lower at Mount Tamalpais, Cal.

The maximum temperature was as high as any recorded during June at Hatteras, N. C., and the minimum as low as any June recorded at Block Island, R. I., Richmond, Va., and Tampa, Fla., and at Portland, Me., 1° lower than any previous June recorded.

Maximum temperatures of 100°, or higher, were reported from west-central Kentucky, central Missouri, southwestern Kansas, western Oklahoma, northeastern and southwestern New Mexico, west-central Texas, southern and western Arizona, the interior of southern California, north-central Louisiana, and south-central Arkansas.

Freezing temperatures were confined to extreme northern States and the western mountain regions.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	60.6	— 2.4	—10.5	—1.8
Middle Atlantic	12	69.6	— 0.5	— 7.1	—1.2
South Atlantic	10	77.2	+ 0.5	— 4.9	—0.8
Florida Peninsula*	8	80.7	+ 0.9	+ 2.5	+0.4
East Gulf	9	79.8	+ 1.0	— 7.4	—1.2
West Gulf	7	80.1	+ 1.1	— 7.4	—1.2
Ohio Valley and Tennessee	11	73.5	+ 0.2	— 8.9	—1.5
Lower Lake	8	67.1	— 1.2	—11.5	—1.9
Upper Lake	10	61.2	— 1.4	— 7.4	—1.2
North Dakota*	8	59.9	— 3.9	+ 1.7	+0.3
Upper Mississippi Valley	11	71.4	+ 0.2	— 7.8	—1.3
Missouri Valley	11	70.5	— 0.1	— 5.8	—1.0
Northern Slope	7	61.1	— 1.9	— 2.2	—0.4
Middle Slope	6	73.8	+ 2.2	— 7.1	—1.2
Southern Slope*	6	77.5	+ 1.4	—12.5	—2.1
Southern Plateau*	13	72.3	— 1.6	— 2.9	—0.5
Middle Plateau*	8	63.7	— 0.6	+ 4.6	+0.8
Northern Plateau*	12	59.7	— 0.8	+ 7.2	+1.2
North Pacific	7	57.1	— 0.5	+ 8.9	+1.5
Middle Pacific	5	62.9	— 1.2	+ 6.7	+1.1
South Pacific	4	65.0	— 1.5	+ 7.6	+1.3

* Regular Weather Bureau and selected cooperative stations.

In Canada.—**Prof. R. F. Stupart says:**

The mean temperature of June was lower than average in nearly all parts of the Dominion, portions of British Columbia and some few districts in Ontario alone showing an average mean record. The largest negative departures, amounting to between 4° and 5°, occurred in Nova Scotia and Prince Edward Island, and departures ranging between 3° and 5° were registered in Manitoba and over a large portion of the Territories.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

The distribution of precipitation was very irregular. Along the south Atlantic coast, the western portion of the east Gulf States, and in the lower Missouri Valley there was a deficiency of from 2.0 to somewhat more than 4.0 inches. Over southern New England, southwestern Pennsylvania, west-central New York, central lower Michigan, northeastern Minnesota, southeastern Iowa, south-central North Dakota, east-central South Dakota, central Nebraska, north-central Kansas, northeastern Washington, and southeastern Texas there was an excess of from 2.0 to somewhat more than 4.0 inches.

By geographic districts the precipitation was normal in the Ohio Valley and Tennessee; below normal in the Middle Atlantic, South Atlantic and east Gulf States, Florida Peninsula, Missouri Valley, middle and southern slope and middle Plateau regions, and the middle and south Pacific districts.

The precipitation was less than any recorded during June since the establishment of station by .01 inch at Flagstaff, Ariz., .02 inch at Modena, Utah, .03 inch at Raleigh, N. C., .15 inch at Hannibal, Mo., .27 inch at Columbia, S. C., .34 inch at Kansas City, Mo., 1.14 inches at Wilmington, N. C., and 1.32 inches at Elkins, W. Va.; and .01 inch greater than any previous June at Tacoma, Wash., .14 inch at North Platte, Nebr., .16 at Nantucket, Mass., .33 inch at Valentine, Nebr., .35 inch at Pocatello, Idaho, .52 inch at Seattle, Wash., .86 inch at Syracuse, N. Y., and 1.08 inches at Houghton, Mich.

Rains were general over New England on the 6–8th, 11–13th, 19th–22d, inclusive, 26th and 27th; Middle Atlantic States 7th, 11th, 12th, and 19–24th, inclusive; South Atlantic States 16–18th, inclusive, and 24th and 25th; Florida Peninsula 21st; east Gulf States 22d, 23d, 27th, and 28th; west Gulf States 21st, 22d, and 25–27th, inclusive; Ohio Valley and Tennessee 7th, 11th, 15th, 19th–23d, inclusive, and 26th; lower Lake region 2d, 4–7th, inclusive, 10th, 11th, 16th, 21st, and 26th; upper Lake region 1st, 4–6th, inclusive, 9th, 10th, 17th, and 25th; upper Mississippi Valley 9th, 10th, 18th, 20th, 25th, 28th, and 30th; Missouri Valley 19th, 20th, and 30th; North Dakota 4th, 5th, 9th, 13th, 15–18th, inclusive, 20th, 23d, and 28th; northern slope 4th, 8th, 9th, 17th, and 22d–24th, inclusive; middle slope 19th, 21st, and 30th; northern Plateau 2d, 4th, and 24th, and north Pacific coast 3d, 5th, and 24–27th, inclusive.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	4.57	149	+1.5	—3.9
Middle Atlantic	12	3.26	89	—0.4	—3.2
South Atlantic	10	2.14	43	—2.8	—3.0
Florida Peninsula*	8	5.02	72	—2.0	—0.1
East Gulf	9	3.81	73	—1.4	+0.7
West Gulf	7	5.11	134	+1.3	+4.1
Ohio Valley and Tennessee	11	4.35	100	0.0	—2.8
Lower Lake	8	3.99	111	+0.4	—1.3
Upper Lake	10	4.40	119	+0.7	—0.1
North Dakota*	8	4.28	120	+0.7	—0.3
Upper Mississippi Valley	11	4.93	109	+0.4	—1.6
Missouri Valley	11	3.84	88	—0.5	+0.3
Northern Slope	7	3.16	119	+0.5	+1.8
Middle Slope	6	2.82	93	—0.2	+3.5
Southern Slope*	6	2.50	68	—1.2	+5.8
Southern Plateau*	13	0.58	121	+0.1	+6.1
Middle Plateau*	8	0.19	32	—0.4	+1.1
Northern Plateau*	12	2.08	141	+0.6	—0.9
North Pacific	7	2.20	105	+0.1	—7.0
Middle Pacific	5	0.08	17	—0.4	—2.6
South Pacific	4	0.01	9	—0.1	+3.1

*Regular Weather Bureau and selected cooperative stations.

In Canada.—**Professor Stupart says:**

The rainfall did not differ much from the average in British Columbia, but to the eastward of the Rockies, in the Northwest Territories and Manitoba, there was considerable excess in most districts and this was especially the case in southern Alberta where Calgary recorded 5.8 inches, which is considerably more than twice the average fall. In northern Saskatchewan there was a small deficiency. In Ontario an excess was fairly general, but in Muskoka and near the north and east shores of the Georgian Bay there was a marked deficiency. In Quebec and northern and western New Brunswick the fall was average, or a little below, while over the larger portions of the Maritime Provinces there was a small excess.

CLEAR SKY AND CLOUDINESS.

The cloudiness was normal in the southern Plateau region; below normal in the South Atlantic and west Gulf States, Florida Peninsula, Ohio Valley and Tennessee, southern slope, middle and northern Plateau, and the middle and south Pacific regions, and above normal in the remaining districts.

The distribution of clear sky is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The average for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.2	+ 1.1	Missouri Valley	5.7	+ 0.9
Middle Atlantic	5.5	+ 0.5	Northern Slope	5.5	+ 0.7
South Atlantic	4.7	— 0.2	Middle Slope	4.6	+ 0.9
Florida Peninsula	4.2	— 1.3	Southern Slope	3.7	— 0.7
East Gulf	5.0	+ 0.2	Southern Plateau	1.9	0.0
West Gulf	4.2	— 0.4	Middle Plateau	2.7	— 0.3
Ohio Valley and Tennessee	4.9	— 0.1	Northern Plateau	4.5	— 0.6
Lower Lake	5.7	+ 0.8	North Pacific	6.5	+ 0.4
Upper Lake	5.6	+ 0.4	Middle Pacific	2.8	— 0.4
North Dakota	6.4	+ 1.2	South Pacific	3.2	— 0.1
Upper Mississippi Valley	5.1	+ 0.1			

HUMIDITY.

The relative humidity was normal in New England, east Gulf States, and the middle Plateau and middle Pacific

regions; below normal in the South Atlantic States and Florida Peninsula, and above normal in the remaining districts.

The averages by districts appear in the following table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	79	0	Missouri Valley	72	+ 5
Middle Atlantic	76	+ 3	Northern Slope	66	+ 9
South Atlantic	73	— 5	Middle Slope	64	+ 4
Florida Peninsula	74	— 6	Southern Slope	68	+ 8
East Gulf	75	0	Southern Plateau	35	+ 5
West Gulf	77	+ 1	Middle Plateau	37	0
Ohio Valley and Tennessee	71	+ 1	Northern Plateau	56	+ 5
Lower Lake	76	+ 5	North Pacific	81	+ 5
Upper Lake	75	+ 2	Middle Pacific	68	0
North Dakota	75	+ 7	South Pacific	68	+ 2
Upper Mississippi Valley	73	+ 3			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Bismarck, N. Dak.	4	56	ne.	Mount Tamalpais, Cal.	2	51	nw.
Buffalo, N. Y.	26	50	w.	Do.	22	58	nw.
Duluth, Minn.	6	59	ne.	Do.	23	52	nw.
El Paso, Tex.	15	52	w.	Do.	24	50	nw.
Lincoln, Nebr.	15	53	se.	Do.	30	56	nw.
Minneapolis, Minn.	3	52	nw.	Mount Weather, Va.	22	54	nw.
Do.	24	62	s.	Valentine, Nebr.	22	60	se.
Mount Tamalpais, Cal.	1	60	nw.				

DESCRIPTION OF TABLES AND CHARTS.

By Mr. WM. B. STOCKMAN, Chief, Division of Meteorological Records.

For description of tables and charts see page 20 of REVIEW for January, 1905.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, June, 1905.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							80.6	— 2.4										73	4.57	+ 1.5									6.2	
Eastport	76	69	82	29.85	29.93	.00	52.0	— 3.1	78	24	59	39	7	45	26	49	46	84	3.03	— 0.5	11	5,567	s.	29	e.	19	5	8	17	7.4	
Portland, Me.	103	81	117	29.82	29.94	— .01	59.2	— 4.1	90	18	67	41	2	51	37	55	52	77	3.08	— 0.3	15	5,601	se.	36	ne.	26	7	5	18	6.8	
Concord	288	70	79	29.63	29.94	— .02	63.0	— 2.3	91	18	75	36	2	51	41	....	....	....	3.81	+ 0.7	14	3,193	se.	25	n.	26	5	11	14	6.5	T.
Northfield	876	16	60	29.01	29.95	— .01	58.8	— 4.8	86	18	70	33	7	47	40	56	53	77	3.89	+ 0.8	16	5,184	s.	34	nw.	3	4	13	13	6.6	
Boston	125	115	181	29.81	29.94	— .02	65.2	— 1.1	90	18	74	46	8	57	33	59	55	75	5.23	+ 2.2	15	6,573	sw.	31	nw.	3	9	7	14	6.0	
Nantucket	12	14	90	29.94	29.95	— .03	59.8	— 1.4	79	15	66	47	8	53	25	57	56	90	6.50	+ 3.7	14	10,903	sw.	46	ne.	6	6	12	12	6.2	
Block Island	26	11	46	29.93	29.96	— .01	61.0	— 1.0	80	15	67	45	9	55	21	58	56	89	5.16	+ 2.6	16	10,809	sw.	46	nw.	26	9	11	10	5.6	
Providence	159	57	67	29.79	29.96	— .01	64.4	.....	88	18	74	42	9	55	36	59	55	75	5.63	.....	13	4,057	sw.	22	sw.	26	9	11	10	5.7	
Hartford	159	115	132	29.78	29.95	— .02	66.2	.....	88	15	76	44	8	56	34	59	55	71	4.85	.....	9	5,027	s.	31	sw.	26	7	13	10	5.8	
New Haven	106	116	154	29.84	29.95	— .02	65.5	— 1.8	87	26	75	45	7	56	32	59	56	74	5.87	+ 2.9	11	5,619	s.	31	w.	26	9	13	8	5.2	
Mid. Atlantic States.							69.6	— 0.5										76	3.26	— 0.4									5.5	
Albany	97	102	115	29.84	29.94	— .03	67.0	— 2.0	87	18	77	44	8	57	34	61	58	75	3.58	— 0.1	13	5,017	s.	33	se.	7	7	12	11	6.1	
Binghamton	875	79	90	29.03	29.95	— .02	65.4	— 0.9	88	19	75	40	4	56	35	....	....	....	3.83	+ 0.5	18	3,784	w.	28	nw.	26	6	9	15	6.4	
New York	314	108	350	29.63	29.96	— .02	68.8	— 0.2	90	18	78	51	8	60	28	63	60	78	4.18	+ 1.0	11	7,275	w.	46	nw.	26	7	12	11	5.9	
Harrisburg	374	94	104	29.57	29.96	— .03	69.8	— 0.7	93	19	78	48	9	61	28	64	60	73	2.79	— 1.5	11	4,281	nw.	26	n.	6	9	7	14	5.9	
Philadelphia	117	116	184	29.85	29.97	— .01	70.8	— 0.9	94	19	80	52	1	62	33	63	58	69	1.77	— 1.4	12	7,089	sw.	31	n.	6	6	15	9	6.0	
Scranton	805	111	119	29.12	29.97	— .01	67.6	.....	90	19	77	42	4	58	35	62	59	75	3.26	.....	14	4,674	sw.	36	w.	26	8	6	16	6.7	
Atlantic City	52	39	48	29.92	29.98	.00	66.0	— 0.8	88	6	72	48	9	60	32	62	60	82	2.27	— 0.9	11	5,718	sw.	31	nw.	27	8	11	11	6.0	
Cape May	17	48	52	29.98	30.00	+ .02	66.7	— 1.5	88	6	72	52	9	61	30	62	....	....	1.82	— 1.4	9	5,861	s.	24	ne.	6	9	16	5	5.0	
Baltimore	123	69	117	29.84	29.97	— .02	72.2	— 1.3	95	19	81	53	1	63	31	65	60	69	4.05	0.0	12	4,944	s.	28	w.	6	6	14	10	6.1	
Washington	112	59	76	29.85	29.97	— .03	71.8	— 1.4	93	19	81	47	9	63	29	65	62	74	4.52	+ 0.5	12	4,140	s.	28	n.	2	9	15	6	5.2	
Lynchburg	681	83	88	29.24	29.97	— .04	74.3	+ 0.1	94	19	84	49	9	65	27	68	65	76	4.92	+ 1.5	13	2,527	e.	21	s.	20	8	21	1	4.6	
Mount Weather	1,725	10	57	28.20	29.97	— .03	67.0	.....	89	19	74	46	1	60	21	62	59	80	5.97	.....	11	8,696	nw.	54	nw.	22	12	12	6	4.6	
Norfolk	91	102	111	29.89	29.99	— .01	73.8	— 1.3	94	6	82	53	2	66	26	67	63	74	2.26	— 2.0	11	6,081	s.	24	sw.	6	9	13	8	5.3	
Richmond	144	82	90	29.84	29.99	— .02	74.2	.....	94	20	84	52	9	65	28	....	....	....	3.72	.....	11	3,825	sw.	24	nw.	19	11	18	1	4.1	
Wytheville	2,293	40	47	27.66	29.97	— .04	68.9	— 0.1	89	19	79	43	9	59	33	64	62	82	3.10	— 1.1	14	2,981	w.	19	w.	24	11	14	5	4.8	
S. Atlantic States.							77.2	— 0.5										73	2.14	— 2.3									4.7	
Asheville	2,255	53	75	27.71	29.99	— .02	70.6	+ 1.2	87	23	81	49	2	60	31	64	62	80	2.92	— 0.8	10	3,766	nw.	23	nw.	26	6	16	8	5.7	
Charlotte	773	68	76	29.17	29.99	— .02	77.5	+ 1.7	95	20	87	55	9	68	23	68	64	68	0.59	— 4.0	6	4,280	sw.	26	nw.	24	7	16	7	5.6	
Hatteras	11	12	47	29.98	29.99	— .02	74.5	+ 0.5	91	24	80	59	9	69	18	69	66	77	2.28	— 2.3	9	9,463	sw.	38	nw.	24	18	8	4	3.4	
Raleigh	376	71	79	29.58	29.97	— .04	75.9	+ 0.2	94	20	85	53	9	67	25	68	65	73	1.72	— 2.2	11	4,151	sw.	22	e.	17	11	16	3	4.4	
Wilmington	78	82	90	29.89	29.97	— .04	75.8	— 0.9	95	24	84	55	2	68	26	69	66	75	1.73	— 4.0	9	5,669	sw.	31	nw.	24	7	22	1	4.7	
Charleston	48	14	92	29.94	29.98	— .03	79.0	— 0.1	97	24	85	66	9	73	19	72	69	76	2.43	— 3.2	8	8,093	e.	40	ne.	8	12	14	4	4.8	
Columbia, S. C.	351	41	57	29.60	29.97	— .04	79.7	+ 0.7	97	26	90	58	10	69	27	70	65	67	0.86	— 3.3	5	4,692	e.	20	e.	8	11	15	4	4.6	
Augusta	180	89	97	29.78	29.97	— .04	80.2	+ 1.4	98	12	90	60	10	70	27	70	66	67	3.72	— 0.9	10	4,508	se.	29	ne.	27	14	15	1	3.5	
Savannah	65	81	89	29.92	29.99	— .02	79.7	+ 0.4	97	26	88	65	10	72	27	71	68	74	2.46	— 4.2	6	5,191	e.	30	e.	8	7	16	7	5.7	
Jacksonville	43	101	129	29.92	29.97	— .04	79.6	— 0.5	95	26	87	66	25	72	28	72	69	74	2.72	— 2.7	7	5,829	e.	39	n.	25	10	15	5	4.7	
Florida Peninsula.							81.1	+ 0.6										74	4.46	— 2.1									4.2	
Jupiter	28	10	48	29.93	29.96	— .05	80.4	+ 1.4	94	29	87	69	12	74	19	74	72	78	2.09	— 4.4	11	6,033	e.	26	se.	23	4	24	2	5.4	
Key West	22	10	53	29.93	29.95	— .04	82.4	— 0.1	90	27	87	74	3	78	13	75	72	71	2.40	— 1.6	8	5,420	e.	25	e.	24	16	11	3	3.5	
Tampa	34	79	96	29.92	29.95	— .06	80.6	+ 0.6	94	23	90	64	6	71	26	73	70	74	8.88	— 0.4	15	4,837	ne.	33	nw.	20	13	15	2	3.8	
East Gulf States.							79.8	+ 1.0										75	3.31	— 1.4									5.0	
Atlanta	1,174	190	216	28.77	29.98	— .03	76.8	+ 1.1	91	20	86	60	10	68	24	69	65	73	4.03	+ 0.1	13	7,155	e.	39	nw.	28	11	15	4	4.6	
Macon	370	93	99	29.60	29.98	— .03	79.8	.....	94	12	89	62	10	70	27	....	....	....	4.49	.....	11	3,940	s.	27	s.	22	6	13	11	6.1	
Pensacola	56	79	96	29.92	29.98	— .01	80.8	+ 1.4	94	8	87	68	2	75	19	....	....	....	0.93	— 4.4	5	6,592	w.	34	sw.	16	12	15	3	4.3	
Birmingham	700	136	143	29.23	29.98	— .01	79.2	0.0	93	20	89	60	2	70	27	....	....	....	3.91	— 0.9	12	4,512	sw.	35	e.	18	6	18	6	5.8	
Mobile	57	88	96	29.92	29.98	— .01	81.6	+ 1.9	95	8	90	66	2	74	23	73	70	73	2.43	— 3.5	10	3,919	s.	22	sw.	22	12	12	6	4.3	
Montgomery	223	100	112	29.74	29.98	— .02	80.4	+ 1.0	95	12	90	61	2	71	28	71	68	73	3.05	— 1.6	6	3,990	sw.	36	nw.	13	11	13	6	4.9	
Meridian	375	84	93	29.58	29.96	— .02	78.6	+ 1.0	92	11	88	58	52	69	28	....	....	....	3.97	— 2.3	12	2,931	sw.	24	nw.	16	14	7	9	4.8	
Vicksburg	247	62	74	29.68	29.95	— .02	79.3	+ 0.1	92	12	87	65	1	71	21	72	70	80	4.60	+ 0.3	13	4,068	sw.	31	nw.	17	9	11	10	5.7	
New Orleans	51	88	121	29.91	29.96	— .02	82.0	+ 1.7	93	88	90	69	15	74	20	74	71	74	7.55	+ 0.9	12	5,078	sw.	39	s.	17	8	17	5	4.9	
West Gulf States.							80.1	+ 1.1										77	5.11	+ 1.3									4.2	
Shreveport	249	77	84	29.68	29.94	— .02	81.2	+ 1.3	96	15	90	68	1	73	26	73	70	76	2.64	— 1.2	10	4,141	se.	30	se.	18	15	6	9	4.7	
Fort Smith	457	79	94	29.44	29.91	— .03	78.9	+ 2.8	95	18	88	60	1	70	27	72	69	76	2.43	— 1.9	10	4,933	e.	33	nw.	20	9	19	2	3.8	
Little Rock	357	93	100	29.56	29.93	— .03	78.4	+ 1.4	95	17	87	63	1	70	22	72	69	76	7.16	+ 2.8	15	4,218	s.	28	nw.	20	10	12	8	4.9	
Corpus Christi	20	48	53	29.88	29.90	— .01	80.9	+ 1.0	89	15	86	70	25	76	16	76	74	81	4.63	+ 2.0	9	8,003	se.	27	s.	26	16	9	5	3.7	
Fort Worth	670	106	114	29.21	29.91	— .01	80.2	.....	96	11	89	67	23	71	25	....	....	....	2.69	.....	8	6,843	s.	28	n.	20	12	16	2	3.9	
Galveston	54	106	112	29.88	29.94	— .01	82.0	+ 0.4	88	18	86	71	22	78	15	76	73	78	7.48	+ 2.6	7	7,404	s.	40	se.	25	16	6	8	4.2	
Palestine	510	73	79	29.39	29.91	— .03	79.4	+ 1.2	94	8	87	65	22	72	21	73	70	77	5.43	+ 1.2	8	4,547	s.	18	n.	20	10	14	6	5.1	
San Antonio	701	80	91	29.17	29.88	— .02	80.2	— 0.5	95	14	89	66	2	71	23	72	70	77	6.01	+ 3.3	10	4,172	se.	24	se.	27	18	9	3	3.7	
Taylor	583	55	63	29.30	29.91	— .01	80.6	.....	95	19	90	67	3	71	23	....	....	....	3.46	.....	7	5,697	s.	30	s.	27	17	8	5	4.0	
Ohio Val. and Tenn.							73.5	+ 0.2										71	4.35	0.0									4.9	
Chattanooga	762	106	112	29.19	29.99	— .01	76.5	+ 1.3	92	19	86	57	2	67	29	69	65	71	4.59	+ 0.1	15	4,384	s.	31	sw.	23	6	17	7	5.4	
Knoxville	1,004	35	88	28.95	29.98	— .02	75.0	+ 1.4	92	18	85	52	2	65	29	67	64	72	3.55	— 0.6	12	4,461	sw.	33	w.	23	9	16	5	4.9	
Memphis	399	76	97	29.55	29.97	.00	78.1	0.0	94	17	86	61	1	71	22	71	67	73	6.63	+ 2.0	13	5,046	sw.	42	sw.	27	10	10	10	5.3	
Nashville	546	122	134	29.40	29.97	— .02	76.8	+ 0.2	94	18	86	56	2	67	29	69	65	71	7.31	+ 3.0	12	4,098	sw.	27	se.	15	10	14	6	4.9	
Lexington	989	75	102	28.93	29.97	— .03	72.3	— 1.3	92	18	81	54	1	64	29	....	....	....	3.31	— 0.9	12	5,932	sw.	30	nw.	11	11	13	6	4.1	
Louisville	525	114	136	29.40	29.98	.00	76.2	+ 1.1	98	18	86	56	1	66	30	67	62	67	4.03	— 0.3	11	5,161	sw.	27	n.	18	10	9	11	5.5	
Evansville	431	72	82	29.49	29.95	— .02	76.6	.....	96	18	86	55	8	67	26	....	....	....	2.28	.....	7	4,661	s.	30	w.	18	9	20	1	4.4	
Indianapolis	822	154	164	29.09	29.96	— .01	71.6	— 0.9	91	17	81	51	8	62	29	65	61	69	3.64	— 1.0	9	6,537	s.	38	n.	17	9	13	8	5.4	
Cincinnati	628	152	160	29.30	29.96	— .03	74.0	+ 0.2	94	19	83	55	1	65	25	65	60	64	2.36	— 2.0	11	4,542	sw.	32	sw.	6	12	11	7	4.8	
Columbus	824	173	190	29.11	29.96	— .03	70.8	— 0.5	92	18	80	50	3	61	29	64	60	72	2.78	— 0.7	13	6,897	sw.	42	nw.	19	11	8	11	5.4	
Pittsburg	842	336	352	29.08	29.96	— .03	71.2	— 0.4	92	19	81	48	3	62	28	63	58	66	6.64	+ 3.2	12	6,168	nw.	42	sw.	17	11	15	4	4.4	
Parkersburg	638	77	84	29.32	29.97	— .03	71.9	— 0.6	94	18	82	48	2	62	33	66	62	74	3.43	— 1.5	13	3,338	sw.	24	se.	16	17	8	5	3.5	
Elkins	1,940	41	50	27.99	29.98	— .02	68.0	+ 1.4	91	20	80	39	4	56	39	62	59	79	3.93	— 0.8	16	2,350	n.	15	sw.	7	7	15	8	5.4	
Lower Lake Region.							67.1	— 1.2										76	3.99	+ 0.4									5.7	
Buffalo	767	178	206	29.13	29.94	— .03	64.0	— 1.0	87	15	70	46	3	58	23	60	56	77	3.45	— 0.1	11	7,593	sw.	50	w.	26	4	15	11	6.9	
Oswego	335	76	91	29.57	29.94	— .03	61.2	— 2.8	86	15	69	43	8	53	27	58	55	80	3.62	+ 0.2	15	5,259	sw.	30	se.	7	8	7	15	6.0	
Rochester	523	81	102	29.39	29.96	— .01	65.5	— 0.9	89	15	74	43	8	57	27	60	57	76	6.06	+ 2.8	14	4,810	sw.	27	w.	26	9	4	17	6.4	
Syracuse	597	97	113	29.31	29.95	— .02	65.4	.....	87	18	74	44	8	57	26	....	....	....	6.66	.....	17	6,169	s.	41	w.	26	8	9	13	6.3	
Erie	713	92	102	29.19	29.95	— .03	65.8	— 1.2	87	18	73	46	3	59	24	61	57	74	2.86	— 1.1	12	5,525	w.	30	w.	26	9	10	11	5.7	
Cleveland	762	190	201	29.15	29.96	— .02	66.4	— 1.4	85	25	73	48	1	60	25	62	59	76	2.73	— 1.1	11	8,169	n.	38	nw.	26	9	10	₁1	5.4	
Sandusky	629	62	70	29.29	29.96	— .02	68.4	— 0.6	89	17	76	50	3	61	26	....	....	....	3.95	0.0	10	4,945	ne.	26	nw.	7	13	5	12	4.9	
Toledo	628	120	127	29.29	29.97	.00	68.6	— 1.2	89	18	78	50	8	60	26	62	58	72	4.81	+ 1.4	10	5,814	e.	29	sw.	5	15	7	8	4.2	
Detroit	730	153	193	29.17	29.96	— .01	67.2	— 0.7	89	18	76	47	3	59	26	61	58	74	4.44	+ 0.8	10	6,172	sw.	26	e.	6	8	11	11	5.6	
Upper Lake Region.							61.2	— 1.4										75	4.40	+ 0.7									5.6	
Alpena	609	13	92	29.31	29.97	+ .01	60.4	+ 0.1	86	19	70	40	3	51	38	56	52	77	3.20	— 0.6	10	6,668	se.	31	se.	8	9	13	8	5.2	
Escanaba	612	40	48	29.32	29.97	+ .03	58.6	— 1.9	82	19	67	42	27	50	26	55	51	75	5.21	+ 1.3	15	5,133	s.	27	nw.	25	14	12	4	4.4	
Grand Rapids	707	127	165	29.20	29.96	.00	67.2	— 1.1	92	17	78	45	27	57	29	60	56	70	7.10	+ 3.9	8	6,073	s.	40	sw.	5	9	14	7	5.3	
Houghton	668	66	74	29.24	29.96	+ .02	57.4	.....	83	30	68	41	27	47	36	....	....	....	5.40	.....	14	5,040	w.	24	n.	1	12	9	9	5.2	
Marquette	734	76	116	29.18	29.99	+ .03	56.8	— 2.2	87	14	66	40	6	48	34	51	47	72	3.79	+ 0.3	13	5,895	nw.	39	s.	3	7	12	11	5.8	
Port Huron	638	70	120	29.29	29.98	+ .01	63.2	— 0.9	86	19	72	41	3	54	28	58	55	77	2.73	— 0.8	10	6,268	ne.	34	nw.	7	8	9	13	6.2	
Sault Ste. Marie	614	40	61	29.30	29.99	+ .03	58.9	— 2.2	83	15	69	36	3	47	35	53	49	74	2.77	— 0.3	11	5,176	w.	38	w.	1	7	13	10	5.7	
Chicago	823	241	274	29.09	29.97	+ .01	65.4	— 1.3	91	6	73	49	2	58	40	59	56	77	3.27	— 0.6	11	8,717	ne.	41	ne.	26	8	17	5	5.0	
Milwaukee	681	124	142	29.23	29.98	+ .03	63.3	0.0	89	5	72	48	3	54	37	57	54	75	3.89	— 0.2	12	6,878	n.	36	sw.	5	9	10	11	5.7	
Green Bay	617	49	86	29.30	29.96	+ .01	63.6	— 3.1	87	14	73	43	3	54	32	59	56	76	3.28	— 0.4	14	6,928	ne.	40	n.	25	6	9	15	6.5	
Duluth	1,133	11	47	28.74	29.95	+ .03	55.5	— 1.3	81	14	64	38	6	47	31	51	48	78	8.75	+ 4.2	19	9,323	ne.	59	ne.	6	5	13	12	6.7	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, June, 1905*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Precipitation, in inches.			Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
North Dakota.							60.3	— 3.6										75	4.86	+ 1.1									6.4	
Moorhead	935	8	57	28.91	29.92	+ .02	61.4	— 3.4	85	13	71	44	21	52	32	57	54	80	5.52	+ 1.2	14	5,546	se.	32	sw.	5	8	7	15	6.4	
Bismarck	1,674	16	57	28.14	29.90	+ .03	60.6	— 3.2	89	3	71	41	17	51	33	55	51	75	5.61	+ 2.1	15	7,865	nw.	56	ne.	4	8	12	10	6.0	
Devils Lake	1,482	11	44	28.35	29.91	+ .03	57.8	.....	85	12	67	34	21	48	35	53	49	76	4.41	.....	15	8,646	se.	46	e.	5	6	6	18	6.8	
Williston	1,875	14	44	27.93	29.88	+ .02	59.0	— 4.3	87	2	70	36	21	48	40	58	48	69	3.44	0.0	16	8,147	se.	47	w.	13	8	8	14	6.4	
Upper Miss. Valley.							71.4	+ 0.2										73	4.93	+ 0.4									5.1	
Minneapolis	.....	102	208	.....	.....	.....	64.9	— 3.9	85	5	74	45	6	56	30	.....	.....	...	7.11	+ 3.3	17	8,222	se.	62	s.	24	5	9	16	7.1	
St. Paul	837	171	179	29.02	29.91	— .01	65.6	— 1.6	86	5	73	48	7	58	27	60	56	74	6.24	+ 1.9	16	6,374	se.	49	nw.	3	7	11	12	5.9	
La Crosse	714	71	87	29.16	29.92	— .01	67.6	— 1.3	89	5	76	50	22	59	29	.....	.....	....	5.75	+ 1.3	17	4,714	s.	26	w.	18	7	16	7	5.6	
Madison	974	70	78	28.92	29.94	.00	66.4	.....	87	5	76	26	3	57	29	61	58	77	2.88	— 1.3	13	6,320	s.	37	n.	1	9	18	3	4.4	
Charles City	1,015	8	58	28.86	29.92	+ .01	67.0	.....	91	4	77	45	22	57	29	62	59	78	5.29	+ 0.2	13	4,942	se.	36	sw.	5	4	16	10	6.5	
Davenport	606	71	79	29.28	29.93	— .01	71.4	+ 0.5	91	4	81	49	27	62	32	65	62	74	7.68	+ 3.3	10	5,207	e.	34	n.	18	11	15	4	4.4	
Des Moines	861	84	101	29.03	29.92	.00	70.6	+ 0.5	90	4	80	51	27	61	30	64	61	73	5.73	+ 0.4	12	6,269	sw.	47	w.	5	3	20	7	6.1	
Dubuque	698	100	117	29.21	29.94	+ .01	70.1	+ 0.6	91	4	79	49	3	61	33	63	59	71	4.33	— 0.9	15	4,789	s.	29	sw.	5	10	17	3	4.8	
Keokuk	614	63	78	29.26	29.93	— .01	74.2	+ 1.7	94	18	84	52	27	64	30	67	64	76	6.57	+ 2.0	9	5,043	se.	34	w.	9	14	11	5	4.1	
Cairo	356	87	93	29.58	29.95	— .02	76.6	+ 1.2	94	18	85	58	1	68	23	70	67	75	6.00	+ 1.6	7	4,750	ne.	30	ne.	28	6	13	11	6.0	
La Salle	536	56	64	29.39	29.96	+ .01	70.4	.....	93	6	82	45	27	59	38	.....	.....	....	4.43	.....	8	4,976	ne.	29	sw.	5	19	9	2	3.2	
Peoria	609	11	45	29.30	29.97	+ .02	71.2	.....	93	18	82	45	8	60	33	.....	.....	....	5.13	.....	6	5,558	se.	36	sw.	18	16	11	3	3.9	
Springfield, Ill.	644	82	93	29.28	29.95	.00	73.5	+ 1.3	97	18	85	48	27	62	32	65	60	65	2.31	— 2.1	6	5,842	se.	29	sw.	30	10	13	7	5.0	
Hannibal	534	75	109	29.37	29.94	— .01	74.7	+ 2.3	99	18	86	54	1	64	32	.....	.....	....	1.54	— 1.8	5	6,534	sw.	36	sw.	5	9	11	10	5.4	
St. Louis	567	208	217	29.34	29.93	— .02	76.2	+ 1.0	96	17	86	56	23	67	26	67	62	65	2.72	— 2.4	6	6,846	sw.	34	sw.	30	10	15	5	4.6	
Missouri Valley.							70.5	— 0.1										72	3.84	— 0.5									5.7	
Columbia, Mo.	784	11	84	29.10	29.90	— .05	76.0	+ 1.7	100	18	87	51	1	65	31	.....	.....	....	3.83	— 1.0	6	5,205	s.	40	sw.	30	12	14	4	4.4	
Kansas City	963	78	95	28.92	29.92	.00	76.0	+ 2.6	95	18	86	58	22	66	31	67	63	67	1.60	— 3.4	8	5,575	s.	36	nw.	18	11	17	2	4.4	
Springfield, Mo	1,324	98	104	28.56	29.93	— .02	74.6	+ 2.2	90	18	83	55	1	66	23	68	65	74	3.26	— 1.2	9	5,843	s.	35	nw.	6	21	7	2	3.1	
Topeka	.....	85	89	.....	.....	.....	75.6	+ 2.4	94	9	86	56	22	65	28	.....	.....	....	2.81	— 2.0	8	6,096	s.	33	s.	5	9	17	4	4.4	
Lincoln	1,189	75	84	28.63	29.86	— .04	71.6	+ 0.5	93	5	82	50	22	61	35	64	60	71	3.43	— 0.8	10	8,128	se.	53	se.	15	4	16	10	6.0	
Omaha	1,105	115	121	28.74	29.89	— .02	72.2	+ 0.7	93	4	82	51	22	63	26	64	59	68	1.70	— 4.0	12	6,502	n.	33	ne.	27	5	12	13	6.6	
Valentine	2,598	47	54	27.22	29.90	+ .04	63.8	— 3.4	95	3	74	40	7	53	36	57	53	73	8.18	+ 4.7	21	7,957	e.	60	se.	22	3	15	12	6.2	
Sioux City	1,135	96	164	28.69	29.88	— .02	69.0	— 1.3	95	5	79	44	22	59	34	.....	.....	....	2.55	— 1.2	11	9,579	s.	49	nw.	18	4	12	14	6.8	
Pierre	1,572	43	50	28.26	29.90	+ .03	65.8	— 2.4	97	3	76	46	7	56	34	58	53	71	3.36	0.0	13	5,891	se.	36	w.	18	5	10	15	6.8	
Huron	1,306	56	67	28.52	29.90	+ .02	63.9	— 2.8	95	3	75	41	22	53	39	59	56	78	7.80	+ 4.2	15	7,973	se.	36	n.	24	2	16	12	6.8	
Yankton	1,233	55	65	28.57	29.87	— .02	67.2	— 1.4	92	3	77	44	22	57	36	.....	.....	....	3.68	— 0.6	15	6,860	nw.	35	s.	3	5	6	19	7.3	
Northern Slope.							61.1	— 1.9										66	3.16	+ 0.5									5.5	
Havre	2,505	11	44	27.28	29.88	+ .03	59.2	— 2.1	89	1	72	34	21	47	42	51	45	64	1.72	— 1.3	15	6,354	e.	35	w.	27	7	18	5	5.2	
Miles City	2,371	42	50	27.39	29.90	+ .05	63.4	— 3.6	92	2	74	43	17	53	35	55	50	69	3.59	+ 0.6	14	4,889	w.	32	sw.	12	9	12	9	5.4	
Helena	4,110	8	56	25.76	29.92	+ .04	55.7	— 3.7	83	1	67	36	24	45	38	47	41	64	2.75	+ 0.3	15	5,030	nw.	33	w.	27	10	10	10	5.7	T.
Kalispell	2,962	11	34	26.86	29.89	.00	55.8	.....	85	1	68	34	15	44	36	48	42	68	2.72	.....	20	3,663	nw.	26	nw.	14	10	15	5	4.7	
Rapid City	3,234	46	50	26.55	29.92	+ .07	60.8	— 3.4	92	3	71	42	17	51	32	55	51	76	3.65	— 0.2	19	1,683	se.	13	w.	5	5	5	20	7.5	
Cheyenne	6,088	56	64	24.00	29.83	— .01	61.6	+ 0.7	88	27	75	42	11	48	38	52	46	63	1.90	+ 0.4	13	7,316	s.	38	s.	17	5	21	4	5.3	
Lander	5,372	26	36	24.58	29.83	— .02	58.9	— 1.2	86	27	74	35	6	44	44	49	41	57	0.88	— 0.3	5	2,951	n.	32	w.	14	7	18	5	4.8	
Yellowstone Park	6,200	11	47	23.84	29.84	— .02	50.1	.....	77	7	62	28	18	38	41	43	34	57	3.05	.....	12	5,006	sw.	37	sw.	27	7	15	8	5.5	8.0
North Platte	2,821	43	52	27.02	29.89	+ .03	68.1	+ 0.2	94	3	79	48	7	57	34	61	58	74	7.63	+ 4.2	13	7,124	e.	45	w.	13	10	12	8	5.1	
Middle Slope.							73.8	+ 2.2										64	2.82	— 0.2									4.6	
Denver	5,291	129	136	24.68	29.83	— .01	67.5	+ 1.1	92	27	81	45	18	54	36	54	46	56	0.61	— 0.8	6	5,372	s.	35	n.	30	10	15	5	4.8	
Pueblo	4,685	80	86	25.23	29.80	— .03	70.6	+ 2.3	98	27	86	50	7	55	45	56	45	49	1.59	+ 0.3	8	5,139	se.	31	ne.	30	13	17	0	3.6	
Concordia	1,398	42	47	28.45	29.89	— .01	74.2	+ 1.9	94	5	84	54	22	64	32	66	62	71	6.19	+ 2.0	13	5,594	s.	28	s.	8	4	21	5	5.7	
Dodge	2,509	44	54	27.33	29.85	— .02	75.4	+ 2.8	101	28	87	55	12	64	34	65	61	66	1.05	— 2.3	4	9,123	se.	38	se.	24	8	20	2	4.8	
Wichita	1,358	78	86	28.51	29.90	— .01	76.6	+ 2.7	94	16	87	58	22	66	27	68	64	71	5.53	+ 0.6	8	6,399	se.	38	n.	15	13	14	3	4.2	
Oklahoma	1,214	79	86	28.63	29.87	— .04	78.3	+ 2.5	95	16	87	62	1	70	23	70	67	73	1.98	— 0.8	7	6,823	se.	34	sw.	16	9	19	2	4.3	
Southern Slope.							76.2	+ 0.8										68	2.50	— 0.6									3.7	
Abilene	1,738	45	54	28.13	29.89	+ .01	79.0	+ 0.6	99	15	90	63	3	69	29	69	65	68	2.82	— 0.4	7	5,519	s.	36	w.	16	8	17	5	5.0	
Amarillo	3,676	10	49	26.22	29.86	+ .01	73.5	+ 1.1	94	28	84	56	21	62	27	64	60	70	2.19	— 0.9	7	9,559	se.	38	sw.	23	25	5	0	2.1	
Roswell	3,578	9	57	26.30	29.84	+ .04	76.2	.....	99	23	91	57	3	62	40	63	57	65	1.78	.....	8	4,144	se.	36	w.	8	13	13	4	4.0	
Southern Plateau.							73.8	— 1.4										35	0.64	+ 0.3									1.9	
El Paso	3,762	10	110	26.12	29.78	+ .03	79.9	— 0.3	100	24	93	61	17	67	35	62	51	48	2.12	+ 1.7	9	5,998	e.	52	w.	15	18	8	4	3.2	
Santa Fe	7,013	33	39	23.28	29.76	— .05	65.8	+ 0.7	85	28	78	45	18	54	32	51	37	38	1.55	+ 0.6	5	5,141	sw.	32	e.	6	20	9	1	2.7	
Flagstaff	6,907	12	44	23.35	29.77	— .01	57.8	— 4.4	84	23	76	30	16	39	48	43	28	38	0.01	— 0.5	1	6,851	sw.	33	sw.	8	24	5	1	1.6	
Phoenix	1,108	50	56	28.59	29.71	— .03	83.6	— 0.3	109	23	100	58	5	67	42	59	37	25	0.15	0.0	1	3,596	e.	20	e.	7	22	6	2	2.2	
Yuma	141	16	46	29.57	29.71	— .03	84.0	— 0.8	107	12	99	61	9	69	37	63	48	36	0.00	0.0	0	3,906	sw.	24	s.	7	28	2	0	0.4	
Independence	3,910	11	42	25.85	29.75	— .03	72.0	— 3.4	97	21	87	47	3	57	38	50	29	24	0.00	0.0	0	5,655	nw.	32	nw.	8	26	3	1	1.1	
Middle Plateau.							64.9	— 0.6										37	0.06	— 0.4									2.7	
Carson City	4,720	82	92	25.21	29.84	— .02	59.4	— 1.8	84	20	74	32	5	44	42	46	36	47	0.01	— 0.4	1	5,527	sw.	34	sw.	22	23	7	0	1.4	
Winnemucca	4,344	18	56	25.52	29.85	— .03	61.3	— 1.1	89	21	79	35	8	43	45	45	32	42	0.13	— 0.6	2	4,655	sw.	36	nw.	7	19	5	6	3.0	
Modena	5,479	10	43	24.52	29.75	— .07	63.4	— 2.0	90	22	81	36	5	46	45	44	21	26	T.	— 0.2	0	10,397	w.	48	sw.	23	24	6	0	2.2	
Salt Lake City	4,366	105	110	25.50	29.77	— .08	67.6	+ 0.7	90	30	80	45	6	55	33	50	34	32	0.23	— 0.6	3	4,969	se.	44	w.	4	20	7	3	3.0	
Durango	6,546	18	56	23.65	29.84	.....	61.9	.....	87	23	80	37	5	44	44	47	35	47	1.21	.....	6	4,448	nw.	29	sw.	3	17	10	3	3.5	
Grand Junction	4,608	43	51	25.26	29.76	— .07	72.9	+ 1.1	96	23	88	50	5	58	40	53	35	30	0.04	— 0.3	2	4,854	se.	31	sw.	8	20	5	5	3.1	
Northern Plateau.							62.0	— 1.0										56	2.26	+ 1.0									4.5	
Baker City	3,471	78	86	26.39	29.94	— .01	56.8	+ 0.1	77	21	68	37	28	46	37	48	40	60	2.59	+ 1.0	11	4,121	se.	24	s.	2	9	6	15	5.8	
Boise	2,739	61	68	27.06	29.89	— .02	61.6	— 4.1	90	11	74	42	28	49	36	50	41	55	1.05	+ 0.2	11	4,343	nw.	28	nw.	12	9	13	8	5.0	
Lewiston	757	10	51	29.08	29.88	— .06	65.6	— 0.2	88	19	77	47	16	54	34	.....	.....	....	2.21	+ 1.2	12	4,336	e.	42	n.	30	16	7	7	3.9	
Pocatello	4,483	46	54	25.39	29.83	— .04	61.5	— 0.5	85	30	75	39	18	48	40	47	33	42	1.17	+ 0.1	7	5,742	sw.	30	w.	4	19	9	2	2.6	
Spokane	1,929	101	110	27.89	29.92	— .02	61.2	— 1.2	82	21	72	43	15	50	30	51	44	60	4.16	+ 2.5	13	4,737	e.	33	nw.	30	8	12	10	5.7	
Walla Walla	1,000	71	79	28.85	29.92	— .04	65.2	— 0.4	88	10	77	48	27	54	31	56	50	62	2.39	+ 1.0	7	4,250	s.	24	sw.	27	15	13	2	3.8	
N. Pac. Coast Reg.							57.1	— 0.5										81	2.20	+ 0.1									6.5	
North Head	211	11	56	29.85	30.07	+ .08	54.0	— 1.5	60	19	57	49	16	51	9	52	50	89	2.30	— 0.3	11	10,365	nw.	40	s.	25	2	5	23	8.2	
Port Crescent	259	12	29	29.77	30.05	+ .02	53.0	— 0.7	66	17	58	40	14	48	23	.....	.....	....	2.10	+ 0.5	6	3,036	w.	12	nw.	10	9	10	11	5.5	
Seattle	123	185	224	29.90	30.03	+ .03	59.2	— 0.8	78	18	67	49	14	52	26	55	52	81	3.03	+ 1.4	7	5,068	s.	22	sw.	21	5	11	14	6.4	
Tacoma	213	113	120	29.79	30.01	— .02	59.0	+ 0.8	77	18	67	46	15	51	26	.....	.....	....	3.23	+ 1.4	7	3,774	sw.	21	sw.	27	5	13	12	6.6	
Tatoosh Island	86	7	57	29.93	30.03	+ .01	52.9	— 0.6	63	28	56	48	7	50	13	51	50	93	1.70	— 2.3	7	7,269	sw.	36	s.	21	0	11	19	8.1	
Portland, Oreg.	153	68	96	29.85	30.01	— .03	61.4	— 0.2	83	10	70	48	14	53	29	55	50	71	2.12	+ 0.3	11	3,554	nw.	18	w.	2	4	14	12	6.7	
Roseburg	498	56	60	29.47	30.00	— .03	60.4	— 0.6	85	20	71	42	28	49	38	53	47	69	0.93	— 0.4	8	3,002	nw.	18	ne.	13	15	9	6	4.2	
Mid. Pac. Coast Reg.							62.9	— 1.2										68	0.08	— 0.4									2.8	
Eureka	62	62	80	29.96	30.04	— .01	54.6	— 0.4	62	1	58	47	26	51	13	52	49	84	0.12	— 1.1	6	6,007	nw.	37	n.	15	4	12	14	6.4	
Mount Tamalpais	2,375	11	18	27.47	29.93	— .02	59.2	.....	81	10	67	44	3	52	24	53	48	69	0.00	.....	0	12,358	nw.	60	nw.	1	23	4	3	2.2	
Red Bluff	332	50	56	29.49	29.83	— .05	74.4	— 0.2	98	10	89	51	1	60	36	57	43	39	0.18	— 0.3	3	3,567	se.	24	nw.	17	24	6	0	1.3	
Sacramento	69	106	117	29.78	29.85	— .04	66.7	— 1.9	95	10	81	48	3	52	37	57	51	64	0.00	— 0.2	0	6,583	s.	27	s.	3	29	1	0	0.6	
San Francisco	155	161	167	29.79	29.96	.00	56.0	— 2.4	67	5	61	49	10	51	15	52	49	82	0.00	— 0.2	0	10,081	w.	42	w.	23	17	13	0	3.3	
S. Pac. Coast Reg.							65.0	— 1.5										68	0.01	— 0.1									3.2	
Fresno	330	67	70	29.49	29.83	— .02	74.4	+ 0.4	104	11	91	50	4	58	39	56	40	38	0.00	— 0.1	0	5,646	nw.	24	nw.	3	27	3	0	0.6	
Los Angeles	338	116	123	29.53	29.89	— .01	64.2	— 1.5	78	20	74	50	19	54	26	57	54	77	0.00	— 0.1	0	3,904	w.	20	sw.	24	9	19	2	3.7	
San Diego	87	94	102	29.79	29.88	— .04	62.7	— 1.4	70	6	67	54	4	59	15	58	55	79	T.	— 0.1	0	4,262	w.	19	nw.	19	25	2	3	3.4	
San Luis Obispo	201	47	54	29.72	29.94	— .01	58.8	— 3.6	77	21	69	44	26	49	28	53	50	79	0.03	— 0.1	1	4,139	nw.	22	w.	4	14	8	8	4.9	
West Indies.																														
Grand Turk	11	6	20	29.97	29.98	— .03	82.0	.....	90	*	88	68	5	76	18	.....	.....	....	8.45	.....	8	.....	e.	.....	.....	.....	.....	.....	.....	.....	
Havana	57	87	105	29.88	29.94	— .01	80.0	— 1.2	92	25	87	65	8	73	22	.....	.....	....	0.88	— 6.3	5	6,839	e.	43	e.	22	23	6	1	1.7	
San Juan	82	48	90	29.90	29.98	— .01	80.6	+ 0.1	90	19	86	73	5	76	14	75	73	78	2.61	— 2.3	16	8,692	se.	29	se.	14	5	12	13	6.5	

* More than one date.

TABLE II.—*Climatological record of cooperative observers, June, 1905.*

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga				6.74	
Anniston	93	49	75.4	6.17	
Ashville	93	51	76.8	6.16	
Benton				3.30	
Bermuda	98	55	80.2	2.51	
Boligee	97	55	80.0	3.51	
Bridgeport				6.99	
Burkeville				1.35	
Camp Hill	99	53	80.8	1.95	
Cedar Bluff				5.65	
Citronelle	93	64	79.8	7.49	
Clanton	97	54	79.2	1.45	
Cordova	97	51	77.6	6.80	
Dadeville				5.12	
Daphne	95	63	81.8	1.77	
Decatur	96	56	77.9	4.75	
Delmar	94	55	77.2	3.11	
Demopolis				2.98	
Eufaula	95	61	79.3	6.10	
Evergreen	95	61	79.4	4.66	
Flomaton	100	59	81.6	6.94	
Florence	95	53	78.0	5.72	
Fort Deposit	96	62	81.0	2.95	
Gadsden	96	54	78.8	2.76	
Goodwater	97	54	79.2	2.16	
Greensboro	95	62	80.4	2.91	
Greenville				3.22	
Guntersville				6.39	
Hamilton	97	51	78.4	3.52	
Highland Home	96	65	80.0	3.21	
Livingston	95	59	80.3	4.83	
Lock No. 4	96	53	78.3	5.60	
Lucy	98			6.53	
Madison Station	97	50	78.1	4.73	
Maplegrove	96	53	77.6	4.81	
Marion	100	59	81.4	3.09	
Milstead				1.75	
Newbern	98	60	80.1	3.64	
Notasulga				3.30	
Oneonta	95	51	77.4	7.74	
Opelika	99	61	82.4	1.53	
Ozark	96	62	80.0	4.25	
Prattville	98	55	80.0	4.62	
Pushmataha	100[c]	55[c]	79.7[c]	3.63	
Riverton	96	50	76.8	7.21	
Scottsboro	92	55	75.6	6.49	
Selma	101	60	82.5	3.55	
Talladega	89[d]	52[d]	75.0[d]	6.81	
Tallassee				5.31	
Thomasville	102	60	81.9	10.70	
Tuscaloosa	97	56	80.1	3.39	
Tuscumbia	98	57	79.6	3.51	
Tuskegee	97	62	81.0	2.46	
Union Springs	96	61	80.4	1.77	
Uniontown	97	56	78.2	6.05	
Valleyhead	95	49	75.6	5.26	
Vienna				4.04	
Wetumpka	97	57	80.4	3.16	
Alaska.					
Chestochena	87	31	54.0	0.90	
Copper Center	88	31	56.0	0.50	
Fort Egbert	88	33	56.8	1.95	
Fort Gibbon	78	35	56.2	1.85	
Juneau	84	41	57.2	2.96	
Ketchumstock	82	21	54.4	1.58	
Killisnoo	83	40	53.3	1.20	
Orca	80	37	53.0	6.51	
Sitka	84	40	52.9	2.25	
Skagway	84	36	57.4	0.10	
Sunrise	76	31	51.7	0.69	
Udakta	62	37	47.0	4.69	
Wood Island	74	42	54.3	3.10	
Arizona.					
Allaire Ranch				0.62	
Alpine				0.19	
Arizona Canal Co. Dam	113	53	83.9	0.46	
Aztec	118	57	87.9	0.00	
Benson	105	41	73.0	1.77	
Blue	100	40	70.6	0.36	
Bowie	100	40	75.2	0.13	
Buckeye	113	45	81.3	T.	
Casagrande	115	60	88.3	0.42	
Cochise[e1]	104	60	76.2	0.53	
Congress	98	62	81.0	T.	
Douglas	105	51	78.6	1.25	
Dragoon				0.89	
Dudleyville	106	50	78.1	0.63	
Duncan	105	38	74.6	0.16	
Flagstaff				0.00	
Fort Apache	95	36	65.8	0.30	
Fort Defiance	88	32	61.5	0.70	
Fort Grant	98			0.17	
Fort Huachuca	98	44	72.4	2.34	
Fort Mohave	111	59	84.8	0.00	
Gilabend	115	54	85.0	0.01	
Globe	102	52	78.2	0.53	
Greaterville	94	50	71.8	1.04	
Greer				0.92	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
***Arizona*—Cont'd.**	°	°	°	*Ins.*	*Ins.*
Huachuca Res				3.61	
Holbrook	97	40	69.5	0.10	
Jerome	95	57	75.9	T.	
Kingman	98	45	73.2	0.00	
Maricopa	116	50	84.5	T.	
Mesa	112	49	82.6	0.38	
Mohawk Summit[s1]	116	73	93.0	0.00	
Natural Bridge				0.23	
Oracle	97	58	77.8	1.21	
Oro				0.27	
Parker	115	42	78.5	0.00	
Phoenix	108	49	80.8	0.19	
Picacho[s1]	112	70	89.0	0.35	
Pinal Ranch				0.76	
Pinto				0.33	
Prescott	96	36	67.0	0.00	
San Carlos	107	49	78.6	0.25	
San Simon	106	48	77.0	0.53	
Seligman	93	35	63.6	0.02	
Sentinel[s1]	116	67	89.2	0.00	
Showlow				0.39	
Taylor	93	30	62.6	0.43	
Tempe	114	47	81.0	0.64	
Thatcher	100	45	75.0	0.71	
Tombstone	97	57	76.8	1.29	
Tucson	102	52	77.8	0.24	
Upper San Pedro	104	49	77.2	2.90	
Walnut Grove				0.00	
Willcox	107	40	75.2	0.77	
Williams	88	33	62.3	0.00	
Yarnell				T.	
Young	107	46	75.4	1.16	
Arkansas.					
Alicia	97	55	77.4	3.96	
Amity	92	61	77.2	12.77	
Arkadelphia	97	62	79.2	21.55	
Arkansas City				6.59	
Arnett[f]	90	60	75.0		
Batesville	96	44	74.8	8.08	
Beebranch	96	56	75.6	2.85	
Black Rock				3.27	
Blanchard	100	59	78.6	4.07	
Brinkley	104	58	80.2	3.39	
Calico Rock				1.80	
Camden	95	63	79.6	8.39	
Clarendon				5.82	
Conway	102	59	80.1	5.10	
Dallas	94[d]	58[d]	77.8[d]	5.57	
Dardanelle				3.56	
Des Arc	96	60	78.5	7.07	
Dodd City	97	52	76.2	1.55	
Dutton	89	52	72.8	3.46	
Eldorado	96	61	79.4	7.38	
Elon	97[c]	59[c]	79.2[c]	7.79	
Eureka Springs	94	53	76.6	2.28	
Fayetteville	94	53	75.4	5.86	
Forrest City	95	56	77.6	4.75	
Fulton				9.68	
Hardy	101	52	77.2	4.42	
Heber	99	54	77.8	6.63	
Helena	97	58	79.2	4.56	
Hope	100	63	81.0	8.74	
Howe	102	64	80.8	8.21	
Jonesboro	100	52	76.9	4.98	
Lacrosse	101	57	80.6	3.00	
Lake Village	98	58	78.7	6.27	
Lonoke	101	57	79.6	8.46	
Lutherville	95	54	76.4	3.15	
Luxora				6.90	
Malvern	98	58	79.3	13.05	
Marked Tree				4.77	
Marvell	98	57	79.4	8.00	
Mossville	90	56	72.4	3.06	
Mountain Home	94[c]	54	75.4[c]	3.06	
Mount Nebo	89	58	75.0	2.03	
New Lewisville	96	63	80.0		
Oregon	92[s]	49	73.0[d]	1.28	
Ozark	93	60	78.2	4.55	
Perry	98	65	81.2	5.40	
Pinebluff	98	61	79.5	4.04	
Pocahontas	99	51	78.0	5.66	
Pond	91	49	75.0	4.06	
Prescott	97	64	79.4	9.77	
Princeton	96	56	79.2	8.17	
Russellville	104	58	80.0	2.19	
Silversprings	90	51	74.9	3.35	
Spielerville	97	60	78.5	3.05	
Springbank				12.45	
Stuttgart	98	57	78.8	7.65	
Tate	97	57	78.6	3.85	
Texarkana	95	62	79.2	12.24	
Warren	99	57	80.0	7.20	
White Cliffs				8.00	
Wiggs	94	56	76.8	7.46	
Winchester	98	59	79.8	5.73	
Witts Springs	90[b]	53[d]	72.6[c]	3.11	
California.					
Alturas	88	33	59.0	0.78	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
***California*—Cont'd.**	°	°	°	*Ins.*	*Ins.*
Angiola	105	43	74.9	0.00	
Auburn	96	41	69.2	0.00	
Azusa	90	40	66.4	0.00	
Bagdad	110	66	87.8	0.00	
Bakersfield	104	45	75.0	0.00	
Barber	100	48	74.3	0.22	
Barstow	98	52	74.4	0.00	
Berkeley	72	46	58.4	0.00	
Bishop	96	39	67.4	0.02	
Blue Canyon	80	32	56.2	0.51	
Bodie	81	16	49.8	T.	
Bowman				1.72	
Branscomb	90	35	59.2	0.02	
Brush Creek	98	40	66.3	0.18	
Butte Valley				1.25	
Calabasas				0.00	
Calexico	106	58	83.4	0.00	
Campbell	90	39	58.6	0.00	
Campo				0.00	
Cedarville	88	32	59.6	0.55	
Chico	95	51	72.9	0.29	
Claremont	90	46	65.8	0.00	
Cloverdale	96	43	66.8	0.00	
Colfax	92	40	69.2	0.20	
Colusa	94	49	70.5	0.17	
Craftonville				0.00	
Crescent City	69	39	54.4	0.45	
Cuyamaca	78	37	56.8	0.00	
Delta	96	46	69.0	0.46	
Diamond				0.00	
Dobbins	97	47	71.0	0.16	
Durham	101	46	71.8	0.33	
Elcajon	86	44	66.6	0.00	
Electra	98	49	72.0	0.00	
Elmwood	105	43	71.2	0.00	
Elsinore	96	50	71.4	0.00	
Emigrant Gap	80	34	62.3	1.00	
Escondido	87	40	66.2	0.00	
Folsom	102	48	72.0	0.00	
Fordyce				1.32	1.0
Fort Ross	67	42	56.2	0.00	
Foster				0.00	
Fruitvale				0.00	
Georgetown	91	38	64.6	0.00	
Gilroy (near)	84	40	61.2	0.00	
Greenville	89	30	57.8	0.41	
Hanford	103	48	74.1	0.00	
Healdsburg	94	42	65.6	0.00	
Hollister	87	40	61.2	0.00	
Indio	110	64	87.2	0.00	
Idylwild	85	32	58.4	0.00	
Imperial	116	52	84.2	0.00	
Iowa Hill	86	40	64.8	0.27	
Irvine				0.00	
Isabella	98	50	75.0	0.00	
Kennedy Gold Mine				0.00	
Kentfield				0.00	
Kernville				0.00	
King City	93	38	64.6	0.00	
Laytonville				0.00	
Le Grand	105	50	74.1	0.00	
Lemoncove	104	46	74.2	0.00	
Lick Observatory	79	36	59.6	0.00	
Livermore	96	43	65.1	0.00	
Lodi	96	43	67.6	0.00	
Lone Pine	98	40	68.4	0.00	
Los Gatos	89	44	63.0	0.00	
Magalia	95	48	72.1	0.00	
Mammoth	113	72	92.0	0.00	
Marysville	98	49	70.7	0.39	
Meadow Valley				0.27	
Merced	105	46	73.2	0.00	
Milo				0.00	
Milton (near)	97	49	70.8	0.00	
Mohave	102	50	77.4	0.00	
Mokelumne Hill				0.00	
Montague	90	39	63.4	0.49	
Monterio	94	40	65.3	0.00	
Monumental	88	35	59.4	0.64	
Mount St. Helena				0.00	
Napa	94	45	64.4	0.00	
Needles	109	68	87.4	0.00	
Nellie				0.00	
Nevada City	91	36	61.9	0.14	
Newcastle	98	56	73.6	0.00	
Newman	105	44	73.4	0.00	
Niles	84	46	63.4	T.	
Nordhoff	89	36	59.6	0.00	
North Bloomfield	90	37	62.6	0.22	
Oakland	77	50	61.8	0.00	
Ontario (near)	91	45	68.2	T.	
Orland	103	48	74.6	0.39	
Orleans	103	46	71.8	0.27	
Oroville (near)	99	46	71.9	0.21	
Ozena				0.00	
Palermo	99	46	71.6	0.13	
Peachland	86	41	59.6	0.00	
Pilot Creek				0.00	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pine Crest	82	47	60.4	0.00	
Placerville	94	40	64.6	0.00	
Point Lobos	69	53	60.0	0.00	
Point Reyes Light	62	47	52.8	0.00	
Porterville	104	47	73.2	0.00	
Poway	84	45	68.4	0.00	
Priest Valley	.....	.....	.....	0.00	
Quincy	88	36	59.4	0.89	
Redding	96	50	74.2	0.15	
Redlands	94	48	68.0	0.00	
Reedley	104	48	74.4	0.00	
Represa	.....	.....	.....	0.00	
Riovista	92	50	67.1	0.00	
Riverside	91	43	65.7	0.00	
Rocklin	96	46	69.3	0.00	
Rohnerville	.....	.....	.....	0.20	
Sacramento	90	48	66.3	0.00	
Salinas	75	45	60.1	0.00	
Salton	110	56	83.4	0.00	
San Bernardino	97	43	68.9	0.00	
San Jacinto	82	45	62.4	0.00	
San Jose	87	43	63.6	0.00	
San Leandro	78	47	60.8	0.00	
San Miguel Island	.....	.....	.....	0.00	
San Rafael	87	45	62.7	0.00	
Santa Barbara	80	48	61.0	0.05	
Santa Clara College	87	41	61.8	0.00	
Santa Cruz	79	40	58.8	0.05	
Santa Maria	75	44	60.2	0.00	
Santa Monica	89	48	64.8	0.00	
Santa Rosa	83	40	60.6	0.00	
Shasta	102	45	76.5	0.17	
Sierra Madre	85	49	64.8	0.00	
Sisquoc Ranch	.....	.....	.....	0.00	
Sisson	95	34	61.9	0.55	
Sonoma	86	43	63.2	0.00	
Sonora	88	56	74.0	0.00	
Southeast Farallon	62	47	53.0	0.60	
Sterling	.....	.....	.....	0.05	
Stockton	93	48	66.8	0.00	
Storey	102	45	71.0	0.00	
Summerdale	80	35	58.3	0.02	
Summit	68	40	57.6	1.40	2.0
Susanville	85	34	59.4	0.20	
Tejon	94	51	73.4	0.00	
Truckee	84	34	57.2	0.00	
Tulare	102	48	72.6	0.00	
Tustin	.....	.....	.....	0.00	
Ukiah	97	40	65.4	0.01	
Upland	88	42	64.1	0.00	
Upperlake	95	35	64.3	0.38	
Upper Mattole	.....	.....	.....	0.39	
Vacaville	96	40	67.0	0.00	
Visalia	103	48	74.3	0.00	
Volcano	116	58	85.6	0.00	
Wasco	106	48	74.9	0.00	
Wasioja	.....	.....	.....	0.00	
Wheatland	99	48	70.2	T.	
Willow	96	50	72.5	0.00	
Woodside	82	44	62.0	0.00	
Yosemite	92	34	62.6	0.34	
Yreka	.....	.....	.....	0.73	
Zenia	84	36	56.4	0.18	
Colorado.					
Akron	.....	.....	.....	2.14	
Alford	90	35	58.6	0.51	
Antelope Springs	78	23	49.9	1.17	
Ashcroft	81	27	53.7	0.49	
Blaine	93	50	74.5	2.70	
Boulder	88	48	66.0	0.55	
Boxelder	.....	.....	.....	1.57	
Breckenridge	77	26	51.6	0.42	
Buenavista	85	33	59.6	0.19	
Burlington	95	41	69.3	4.69	
Canon City	99	41	69.2	0.32	
Cheesman	93	38	64.0	0.16	
Cheyenne Wells	97	44	69.9	2.58	
Clearview	75	30	53.1	0.70	
Collbran	90	32	64.6	0.10	
Colorado Springs	90	44	64.0	0.82	
Conejos	80	38	59.8	0.63	
Cripplecreek	.....	.....	.....	0.78	
Delta	96	41	69.6	0.34	
Eagle	84	27	57.4	0.17	
Fort Collins	92	40	64.8	0.64	
Fowler	.....	.....	.....	0.93	
Fox	95	43	68.4	3.46	
Frances	83	36	58.5	0.51	
Fruita	95	39	67.8	0.10	
Garnett	85	32	58.2	0.33	
Gleneyre	92	40	63.5	0.66	
Glenwood Springs	90	30	61.2	0.05	
Grand Valley	92	36	65.4	0.06	
Greeley	96	47	67.8	0.55	
Grover	.....	.....	.....	1.30	
Gunnison	83	26	55.8	0.33	
Halls Gulch	69	27	45.9	0.31	
Hamps	91	43	63.4	2.04	
Hoehne	98	36	67.2	0.45	
Holly	103	48	73.7	1.96	
Holyoke	93	44	69.8	2.45	
Idaho Springs	85	38	60.8	0.52	
Lake City	78	32	55.8	0.18	
Lake Moraine	72	30	51.6	1.25	
Lamar	104	52	75.8	1.18	
Laporte	.....	.....	.....	0.73	
Las Animas	104	50	74.9	0.77	
Lay	87	23	58.3	0.13	
Leroy	89	41	65.6	2.48	
Longs Peak	76	29	53.0	0.47	
Mancos	88	36	63.8	0.72	
Meeker	87	30	58.9	0.08	
Montrose	83[1]	34[f]	60.5[f]	0.70	
Moraine [1]	80	32	57.8	.....	
Pagoda	85	29	57.8	0.22	
Paonia	93	42	68.0	0.84	
Platte Canon	.....	.....	.....	1.00	
Rockyford	100	50	72.4	1.56	
Saguache	87	34	59.0	0.50	
Salida	88	30	61.2	0.10	
San Luis	82	28	55.4	0.46	
Santa Clara	88	35	60.0	2.13	
Sapinero	82	29	57.2	0.73	
Sheridan Lake	100	47	71.6	1.93	
Silt	90	38	65.0	0.16	
Silverton	77	23	50.2	1.12	
Sugar City	.....	.....	.....	3.36	
Sugar Loaf	85	39	58.9	1.28	
Trinidad	94	46	70.3	0.38	
Victor	81	36	57.8	0.60	
Vilas	.....	.....	.....	0.97	
Waterdale	92	37	63.4	0.58	
Westcliffe	85	30	60.2	0.12	
Whitepine	75	23	50.6	0.10	
Wray	97	42	70.7	3.19	
Yuma	.....	.....	.....	2.16	
Connecticut.					
Bridgeport	90	43	66.6	4.30	
Canton	85	36	62.4	3.77	
Colchester	85	37	63.7	5.52	
Falls Village	.....	.....	.....	3.31	
Hawleyville	87	39	64.3	4.02	
Lake Konomoc	.....	.....	.....	5.32	
New London	86	42	64.9	5.72	
North Grosvenor Dale	88	36	64.1	3.93	
Norwalk	90	39	66.4	2.85	
Southington	86	38	64.8	4.90	
South Manchester	.....	.....	.....	9.64	
Storrs	85	41	64.2	4.53	
Voluntown	87	35	63.1	5.81	
Wallingford	.....	.....	.....	4.56	
Waterbury	90	37	65.4	4.22	
West Cornwall	87	40	64.2	3.90	
West Simsbury	.....	.....	.....	3.53	
Delaware.					
Delaware City	.....	.....	.....	3.81	
Milford	99	45	72.7	3.43	
Millsboro	99	43	72.1	4.48	
Newark	94[e]	46[f]	70.6[f]	3.65	
Seaford	89	45	69.2	4.02	
District of Columbia.					
Distributing Reservoir[g h]	92	52	74.0	4.76	
Receiving Reservoir[g h]	90	51	73.4	3.60	
West Washington	96	46	73.0	5.10	
Florida.					
Apalachicola	95	68	82.2	0.60	
Archer	98	60	81.4	9.69	
Avon Park	96	61	80.4	4.48	
Bartow	97	59	81.2	2.59	
Bonifay	97	62	80.8	4.32	
Brooksville	95[d]	69[d]	80.2[d]	9.83	
Carrabelle	98	62	80.9	1.98	
Caxambas	96	69	81.8	4.49	
Clermont	99	63	81.4	5.86	
De Funiak	99	60	79.9	4.04	
Eustis	99	58	80.6	4.49	
Federal Point	98	58	79.6	3.22	
Fernandina	97	65	80.2	2.32	
Flamingo	94	66	82.1	1.29	
Fort Meade	96	59	81.6	9.99	
Fort Myers	94	65	80.7	5.97	
Fort Pierce	96	62	79.5	2.62	
Gainesville	98	61	80.4	8.82	
Grasmere	97	62	81.2	.....	
Huntington	99	60	80.6	4.67	
Hypoluxo	93	65	79.7	2.72	
Inverness	93	61	79.5	7.65	
Jasper	96	60	80.0	2.86	
Johnstown	95	55	80.2	3.30	
Kissimmee	94	59	79.4	4.46	
Lake City	97	58	79.9	5.34	
Macclenny	100	52	80.3	4.36	
Madison	97	62	80.6	4.36	
Malabar	97	63	80.8	2.51	
Manatee	94	59	80.2	5.13	
Marianna	.....	.....	.....	4.95	
Merritt Island	93	69	80.5	4.37	
Miami	94	66	80.6	7.61	
Middleburg	99	48	78.6	3.59	
Molino	98[e]	56[e]	79.4[e]	7.58	
Monticello	96	59	79.9	3.76	
Mount Pleasant	98	60	80.8	4.31	
New Smyrna	100	56	78.8	5.31	
Nocatee	95	61	81.0	3.98	
Ocala	100	59	80.5	6.19	
Orange City	101	55	81.3	5.52	
Orange Home	97	60	79.8	14.86	
Orlando	97	59	80.0	8.13	
Pinemount[s]	100	50	79.6	.....	
Plant City	95	59	79.4	8.38	
Rockwell	96[e]	60[e]	81.0[e]	6.96	
St. Andrews	95	60	80.8	2.29	
St. Augustine	96	60	79.8	1.42	
St. Leo	95	60	79.8	6.97	
Sand Key	95	72	83.2	0.78	
Stephensville	96	54	79.7	4.75	
Sumner	93	53	78.6	5.87	
Switzerland	96	58	78.7	2.02	
Tallahassee	94	64	80.0	3.50	
Tarpon Springs	95	61	80.2	5.72	
Titusville	99	61	80.2	4.67	
Wausau	.....	.....	.....	4.85	
Georgia.					
Abbeville	.....	.....	.....	4.23	
Adairsville	92[b]	58[b]	76.2[b]	6.30	
Albany	98	61	81.8	3.02	
Allapaha	97	59	80.4	3.03	
Americus	96	62	81.0	4.39	
Athens	95	59	78.4	3.04	
Bainbridge	100	59	81.8	3.93	
Blakely	100	62	81.3	4.91	
Bowersville	96	53	78.6	2.93	
Butler	.....	.....	.....	3.06	
Camak	95	57	78.0	1.63	
Canton	.....	.....	.....	3.91	
Carlton	.....	.....	.....	2.58	
Clayton	89	44	72.0	7.85	
Columbus	97	64	81.3	5.39	
Cordele	96	60	79.4	5.14	
Covington	97	62	80.1	2.02	
Cuthbert	92	64	80.5	3.06	
Dahlonega	91	53	73.2	6.00	
Dawson	98	60	82.5	2.31	
Diamond	86	49	72.0	8.00	
Dudley	99	60	80.7	2.08	
Eastman	101	62	82.6	2.89	
Eatonton	95[e]	54[e]	79.0[e]	3.39	
Elberton	96	56	79.0	1.74	
Experiment	94	57	78.8	4.97	
Fitzgerald	101	61	80.8	2.87	
Fleming	101	58	80.0	3.47	
Forsyth	96	54	79.0	3.37	
Fort Gaines	94	63	80.2	5.43	
Gainesville	91	56	75.8	3.47	
Gillsville	92	54	77.0	1.77	
Glenville	98	60	80.3	2.41	
Greenbush	95	52	76.8	3.11	
Greensboro	98	54	79.6	2.01	
Griffin	96	57	79.3	1.05	
Harrison	96	56	78.7	2.32	
Hawkinsville	102	58	81.6	3.64	
Lost Mountain	94	54	77.2	5.82	
Louisville	99	59	80.6	2.85	
Lumpkin	96	60	79.4	2.25	
Marshallville	98	63	81.3	2.65	
Mauzy	97	59	80.0	7.40	
Milledgeville	96	58	79.9	3.24	
Millen	99	55	80.4	2.35	
Montezuma	.....	.....	.....	3.20	
Monticello	98	56	79.8	8.18	
Morgan	94	62	79.0	4.38	
Newnan	98	56	78.6	4.09	
Oakdale	.....	.....	.....	4.91	
Point Peter	97	52	79.2	1.09	
Poulan	98	60	79.8	7.02	
Putnam	98	59	81.1	4.01	
Quitman	99	58	80.8	3.04	
Ramsey	92	51	75.6	7.65	
Resaca	.....	.....	.....	3.11	
Rome	96	53	77.7	3.62	
St. Marys	103	59	80.7	1.41	
Statesboro	100	59	80.6	6.49	
Talbotton	99	57	79.4	1.50	
Tallapoosa	94	57	77.4	2.55	
Thomasville	98	59	80.6	6.33	
Toccoa	90	52	74.5	4.52	
Valdosta	97	57	80.2	4.04	
Valona	97	60	80.4	1.25	
Vidalia	98	64	81.2	4.73	
Washington	94	58	77.9	1.74	
Waverly	101	58	79.7	6.94	
Waycross	99	60	80.8	3.19	
Waynesboro	97	57	79.5	2.47	
Westpoint	102	56	81.9	1.64	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Georgia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Woodbury	98	56	78.0	1.63	
Idaho.					
Albion	86	33	59.2	1.12	
American Falls	89	35	60.9	1.43	
Blackfoot	87	34	60.3	1.00	
Blue Lakes	92	40	64.4	0.67	
Burnside	80	35	58.0	3.20	
Caldwell	92	40	63.0	1.56	
Cambridge	87	35	60.6	1.86	
Chesterfield	86	29	56.6	0.91	
Collins				3.44	
Ellerslie	88	32	60.4	0.71	
Fernwood	83	30	57.3	5.62	
Forney	85	25	53.2	3.58	
Franklin				0.38	
Garnet	97	48	69.4	0.50	
Grangeville	79	37	56.4	3.53	
Hailey	81	31	55.9	1.81	
Hope				3.65	
Idaho City	85	32	56.6	0.45	
Idaho Falls	83	34	59.6	2.00	
Kellogg	81	33	57.6	3.15	
Ketchum				1.11	
Lakeview	80	39	58.6	3.89	
Landore	72	31	50.3	2.29	
Lardo				3.23	
Lemhi Agency				2.79	T.
Lost River	80[d]	34[d]	55.6[d]	1.46	T.
Lovell	82	31	58.2	3.37	
Malad	80			0.20	
Meadows	88	30	56.0	3.06	
Milner	88	36	61.8	0.59	
Minidoka	91	38	62.5	0.91	
Mink Creek	82	38	62.6	0.80	
Moscow	86	41	58.6	2.89	
Murray	84	29	55.2	3.72	
Oakley	87	35	59.7	0.80	
Ola	86	36	60.2	1.11	
Orofino	90	39	64.0	3.70	
Paris	79	31	55.4	0.38	
Pearl				1.24	
Payette	96[c]	40[c]	65.0[c]	0.89	
Poplar				1.21	
Porthill	83	34	58.7	1.67	
Priest River	85	43	62.9	2.40	
Roosevelt	68	26	46.5	2.91	4.3
St. Maries	81	35	59.8	3.45	
Salem				0.99	
Soldier	81	21	49.3	1.20	
Standrod				0.47	
Vernon	83	31	55.6		
Victor	82	40	60.7	1.10	
Westlake				4.56	
Weston	91	33	60.6[c]	0.56	
Illinois.					
Albion	100	52	76.2	1.83	
Aledo	90	44	70.8	4.52	
Alexander	97	46	74.0	3.61	
Antioch	91	38	66.2	2.95	
Ashton	90	38	67.5	2.73	
Astoria	93	47	71.6	2.83	
Aurora	91	43	68.0	6.16	
Beardstown				3.98	
Benton				2.22	
Bloomington	100	44	74.4	3.44	
Bushnell	95	46	74.0		
Cambridge	92	46	72.0	5.21	
Carlinville	99	47	75.2	1.20	
Carlyle				5.81	
Carrollton	102	50	75.2	3.82	
Charleston	97	48	74.4	1.78	
Chester	104	55	79.2	1.87	
Clane	99	50	75.9	3.89	
Coatsburg	98	48	74.4	4.55	
Cobden	99	52	77.3	2.10	
Colchester	92	49	73.0	7.03	
Decatur	99	45	74.2	1.69	
Dixon	95[c]	43[c]	71.0[d]	3.35	
Effingham	95	49	73.4	2.59	
Equality	99	50	77.8	2.21	
Flora	100	50[c]	74.8[b]	2.29	
Friendgrove	95	51	74.3	3.44	
Galva	92	44	70.7	5.16	
Grafton				0.49	
Greenville	99	49	74.7	4.26	
Griggsville	99	50	76.1	1.60	
Halfway	99[1]	57[1]	76.2[1]	2.23	
Havana	100	49	75.0	2.71	
Henry	93	45	71.6	5.46	
Hillsboro	101	48	75.4	1.96	
Hoopeston	96	44	71.6	2.15	
Joliet	93	46	69.4	5.10	
Kishwaukee	90	38	69.1	2.65	
Knoxville	91	44	70.6	4.26	
Lagrange	93	41	67.0	3.33	
Laharpe	95	50	72.1	12.60	
Lanark	92	38	68.4	3.15	
Loami				4.51	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
McLeansboro	101	53	76.0	1.81	
Martinsville	96[d]	43[d]	72.0[d]	1.55	
Martinton	98	42	70.0	4.38	
Mascoutah	99	50	74.2	1.64	
Mattoon	95	50	76.8	0.55	
Minonk	95	41	70.8	3.35	
Monmouth	95	45	72.4	3.87	
Morrison	91	43	69.4	4.03	
Morrisonville	99	47	74.2	1.91	
Mount Carmel				2.39	
Mount Pulaski	98	44	74.2	2.11	
Mount Vernon	100	50	75.9	2.14	
New Burnside	99	48	76.2	2.31	
Olney	99	50	75.0	2.09	
Ottawa	94	45	70.8	3.39	
Palestine	100	51	74.6	1.46	
Pana	99	46	74.2	2.29	
Paris	95	42	73.3	0.45	
Philo	96	46	71.4	3.54	
Plumhill	99	50	74.8	2.97	
Pontiac	95	46	71.9	1.70	
Rantoul	97	43	72.0	2.68	
Raum	98	53	75.8	2.04	
Riley	88	42	67.2	6.32	
Robinson	95	49	73.0	2.10	
Rushville	94	48	73.9	5.33	
St. Charles	93	40	68.0	3.46	
St. John	101	50	76.8	3.56	
Shobonier	100	50	75.8	5.47	
Streator	93	43	70.0	3.01	
Sullivan	98	44	73.6	2.36	
Sycamore	94	40	68.6	4.30	
Tilden	100	51	76.0	0.26	
Tiskilwa	92	44	69.6	5.72	
Tuscola	95	45	73.2	1.27	
Urbana	97	46	71.1	1.30	
Walnut	94	44	71.6	5.20	
Warsaw				6.02	
Winchester	98[c]	50[b]	73.6[c]	2.67	
Windsor	98	47	73.2	3.46	
Winnebago	90	40	67.9	3.76	
Yorkville	96	41	70.0	4.62	
Zion	92	43	68.4	4.84	
Indiana.					
Anderson	99	47	70.8	3.47	
Angola	90	46	68.6	4.10	
Auburn	97	43	68.0	5.03	
Bedford	93	52	73.9	3.68	
Bloomington	92	53	72.3	2.67	
Butlerville	97	48	72.8	3.04	
Cambridge City	92	45	70.4	4.19	
Columbus	94	48	72.3	5.46	
Connersville	97	49	72.0	2.85	
Crawfordsville	94	45	71.6	2.50	
Delphi	94	43	70.3	4.11	
Elkhart	94	45	70.0	3.14	
Farmersburg	98	49	72.8	3.02	
Farmland	91	45	70.0	1.61	
Fort Wayne	91	46	68.8	6.02	
Franklin	95	50	73.2	0.93	
Greencastle	92	47	71.6	4.08	
Greenfield	93	46	72.4	3.00	
Greensburg	96	48	72.5	3.14	
Hammond	90	50	66.5	4.72	
Hector				2.20	
Holland	98	51	75.4	1.38	
Huntington	92	46	69.1	6.85	
Jeffersonville	97	53	75.9	3.69	
Kokomo	92	44	71.4	3.84	
Lafayette	92	45	70.8	2.97	
Laporte	87	45	67.0	5.11	
Logansport	94	44	70.0	3.40	
Madison	98	50	75.8	4.99	
Marengo	95	48	73.6	4.17	
Marion	93	45	69.8	4.97	
Markle	89	43	68.2	4.65	
Mauzy	93[c]	45[c]	71.0[c]	2.83	
Moores Hill	96	50	72.0	2.15	
Mount Vernon	100	56	80.2	3.25	
Northfield	93	43	69.2	2.26	
Paoli	96	52	73.0	2.29	
Princeton	98	52	75.2	5.35	
Rensselaer	93	44	70.4	2.77	
Richmond	95	44	70.6	3.17	
Rochester	91	43	68.4	4.65	
Rockville	91	44	70.8	2.67	
Rome	99	47	75.4	3.74	
Salem	102	48	75.0	2.36	
Scottsburg	98	51	75.7	3.89	
Seymour	94	50	71.4	1.54	
Shelbyville	95	47	71.8	1.46	
South Bend	90	41	67.6	2.44	
Syracuse	94	43	69.8	5.11	
Terre Haute	95	51	75.5	2.23	
Valparaiso	94	42	69.6	6.72	
Veedersburg				2.17	
Vevay	93	52	74.0	2.85	
Vincennes	99	52	75.7	4.71	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Washington	95	52	73.8	7.30	
Winamac	95	41	69.4	4.46	
Worthington	94	51	73.7	5.60	
Indian Territory.					
Ardmore	99	61	80.2	2.53	
Calvin				0.88	
Chickasha	102	64	83.2	1.05	
Durant	98	61	79.0	2.60	
Fairland	92	52	76.5	7.38	
Fort Gibson				1.97	
Goodwater	98	64	80.2	7.93	
Hartshorne	96	63	80.4	2.99	
Healdton	98	58	79.2	0.99	
Holdenville	97	59	79.8	1.76	
Marlow	95	60	78.2	3.42	
Muskogee	93	57	77.8	1.86	
Okmulgee	96	53	78.0	0.87	
Pauls Valley	99	59	78.8	2.45	
Ravia	97	62	79.8	1.58	
Roff	95	58	78.2	5.42	
South McAlester	96	59[c]	80.0[c]	1.42	
Tahlequah				2.19	
Tulsa	98	63	79.7	4.30	
Vinita	92	53	77.3	4.95	
Wagoner	93	56	78.2	2.58	
Webbers Falls	96	56	79.0	1.84	
Iowa.					
Afton	93	48	71.4	6 12	
Albia	92	50	70.6	9.06	
Algona	91	42	68.0	5.55	
Allerton	91	50	71.6	5.17	
Alta	90	42	67.6	5.73	
Alton	92	39	67.8	7.20	
Amana	91	49	70.8	7.62	
Ames	91	46	70.4	4.23	
Atlantic	94	44	71.8	5.59	
Audubon	93	41	70.2	5.95	
Baxter	90	42	70.2	4.50	
Bedford	90	49	71.4	2.96	
Belleplaine	95	48	69.8	4.49	
Bonaparte	94	50	71.4	14.50	
Boone	92	47	69.1	6.59	
Britt	92	42	68.4	3.56	
Burlington	93	52	73.2	7.67	
Carroll	93	43	69.6	3.59	
Cedar Rapids	94	49	71.0	3.70	
Chariton	90	50	70.4	9.70	
Clarinda	96	48	72.3	3.80	
Clearlake	91	45	69.4	4.25	
Clinton	94	43	71.6	4.02	
College Springs	92	50	72.5	2.56	
Columbus Junction	92	50	71.4	6.05	
Corning	92	43	70.8	5.07	
Corydon	89	51	71.4	9.07	
Cresco	88	44	66.3	4.67	
Creston	90	48	68.8	6.22	
Cumberland				5.81	
Decorah	89	45	68.6	6.31	
Delaware	91	42	68.8	5.35	
Denison	91[b]	49[c]	69.6[c]	2.22	
Desoto	90	49	70.4	5.94	
Dows	91	39	67.8	5.64	
Earlham	90	43	68.5	6.96	
Elkader	95	45	70.4	4.49	
Elliott	95	46	73.7	3.27	
Estherville	91	40	66.6	3.48	
Florence				5.01	
Forest City	91	43	67.2	1.80	
Fort Dodge	92	44	69.0	3.07	
Fort Madison				8.26	
Galva	88	38	67.6	5.00	
Gilman				5.24	
Glenwood	92	44	71.2	2.72	
Grand Meadow	89	46	67.6	5.36	
Greene	93	44	69.4	4.68	
Greenfield	97	45	72.4	8.74	
Grinnell	91	47	70.7	5.95	
Grundy Center	91	45	69.0	4.24	
Guthrie Center	92	46	71.2	5.61	
Hampton	95	45	69.5	4.99	
Hancock	93	47	70.8	2.72	
Hanlontown	88	42	65.6	4.55	
Harlan	92	44	70.6	3.80	
Hopeville	91	49	70.9	4.64	
Humboldt	88	43	67.2	2.44	
Ida Grove	93	46	70.0	3.13	
Independence	90	45	68.8	4.33	
Indianola	92	48	71.0	6.98	
Inwood	92	38	67.3	9.92	
Iowa City	94	47	70.8	6.68	
Iowa Falls	92	46	68.1	3.52	
Keosauqua	95	50	71.8	14.89	
Knoxville	92	51	72.2	8.72	
Lacona				8.85	
Larrabee	98	39	69.8	3.90	
Leclaire				6.37	
Lemars	95	41	71.2	4.31	
Lenox	92	48	71.2	5.93	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Leon	92	50	72.1	5.08	
Little Sioux	94	45	71.6	3.18	
Logan	95	44	72.0	2.53	
Maple Valley				7.23	
Maquoketa	91	41	68.4	3.13	
Marshalltown	94	45	69.6	4.69	
Mason City	91	45	68.8	4.80	
Massena	94	47	72.0	5.74	
Montezuma				6.90	
Mountayr	93	48	72.2	7.09	
Mount Pleasant	94	48	72.7	10.06	
Mount Vernon	92	46	70.2	4.07	
Muscatine				4.36	
Nevada				4.92	
New Hampton	90	47	68.4	4.65	
Newton	91	50	69.8	5.82	
Northwood	90	43	67.3	3.89	
Odebolt	90	43	71.4	3.64	
Ogden	92			6.35	
Olin	90	46	69.8	5.06	
Onawa	95	46	72.6	2.86	
Osage	92	42	67.4	5.52	
Oskaloosa	92	52	71.6	6.72	
Pacific Junction	94	50	71.8	3.40	
Perry	92	47	70.6	6.97	
Plover	93	42	68.1	4.42	
Pocahontas	93	41	68.2	4.25	
Redoak	100	51	74.5	3.87	
Ridgeway	90	48	69.7	5.26	
Rock Rapids	93	46	67.6	9.17	
Rockwell City	93	46	70.6	2.05	
Sac City	90	43	68.2	2.07	
St. Charles	90	50	70.4	4.19	
Sheldon	94	47	69.1	6.79	
Sibley	92	40	64.5	7.19	
Sidney	96	50	74.0	2.50	
Sigourney	93	50	72.5	7.48	
Sioux Center	91	38	66.1	8.87	
Stockport	90	52	71.4	14.57	
Storm Lake	88	39	66.1	5.20	
Traer				5.83	
Thurman	96	49	73.4	5.98	
Tipton	93	51	72.6	5.92	
Toledo	90	47	69.8	4.45	
Vinton	90	48	69.0		
Wapello	90	52	70.6	4.67	
Washington	91	49	70.6	5.36	
Washta	93	36	68.3	5.75	
Waterloo	94	47	69.0	5.53	
Waukee	96	47	71.7	7.31	
Waverly	90	48	68.1	6.76	
Webster City	95	43	70.8	3.06	
Westbend	90	42	68.2	5.23	
Whitten	93	44	70.2	4.16	
Wilton Junction	95	45	72.7	6.57	
Winterset	92	48	71.8	6.24	
Woodburn	92	46	71.1	6.80	
Zearing	90	47	69.4	4.62	
Kansas.					
Abilene				0.58	
Achilles	99	42	70.7	4.20	
Alton	98	48	74.6	6.02	
Anthony				3.40	
Atchison	96	53	75.2	2.21	
Baker	91	51	73.2	3.05	
Beloit				6.33	
Blue Rapids				3.40	
Burlington	97	50	77.2	2.65	
Chapman	97	55	76.4	4.61	
Clay Center	95	49	74.9	9.18	
Colby	99	42	71.4	2.94	
Columbus	92	53	76.2	5.10	
Cottonwood Falls	94	53	76.4	2.07	
Cunningham	98	53	77.0	2.49	
Dresden	97	46	72.2	1.68	
Eldorado	94	56	76.2	4.01	
Ellinwood	97	55	75.9	5.41	
Ellsworth	97	52	75.7	4.58	
Emporia	92	53	75.2	2.28	
Englewood	102	60	81.2	3.04	
Enterprise	96	53	74.8	4.75	
Eureka				5.11	
Fall River	94	53	76.0	3.70	
Farnsworth	104	44	74.0	1.44	
Forsha	97	53	76.2	4.00	
Fort Leavenworth	95	56	76.9	2.84	
Fort Scott	96	50	76.5	4.17	
Frankfort	96	48	74.6	4.99	
Garden City	103	52	75.4	4.57	
Gove*[1]	100	55	73.8	4.97	
Grenola	92			7.79	
Harrison	96	48	72.4	4.30	
Horton	93	52	73.5	2.85	
Hoxie	99	47	73.6	1.33	
Hugoton	103	53	75.5	0.57	
Hutchinson	97	54	76.2	5.84	
Independence	100	56	79.8	3.48	
Iola				2.15	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Jewell	95	50	74.2	9.84	
La Crosse	104	50	76.6	3.43	
Lakin	103	51	74.0	1.86	
Larned	102	47	74.9	2.71	
Lebo	99	54	77.5	1.94	
Lindsborg				5.40	
Macksville	100	52	75.1	1.85	
McPherson	98	54	76.4	5.02	
Madison	95	51	76.0	2.46	
Manhattan[b]	98	52	78.2	3.89	
Manhattan[c]	98	49	76.2	3.71	
Marion	92			4.50	
Medicine Lodge	108	58	80.8	4.41	
Minneapolis	95	51	74.5	6.14	
Moran	94	53	77.2	2.45	
Mounthope	93	54	76.7	3.05	
Neosho Rapids				1.98	
Ness City	102[f]	50[g]	77.8[g]	2.81	
Newton	98[h]	57	75.7[g]	2.24	
Norton	95	48	72.8	3.10	
Norwich	97	55	76.8	5.11	
Oberlin				2.96	
Osage City	95	52	75.9	2.12	
Osborne				6.87	
Oswego	90	54	76.0	5.77	
Ottawa	93	49	75.8	4.85	
Plainville	95	51	71.6	5.27	
Pleasanton	93	55	76.7	2.09	
Pratt	100	57	78.0	2.65	
Republic	98	50	73.3	4.31	
Rome	98	59	72.1	5.33	
Russell	98	52	74.4	7.46	
Salina	97	53	74.8	13.64	
Sedan	93	56	77.1	5.09	
Toronto	97	50	76.0	3.80	
Ulysses				1.75	
Valley Falls	94	52	73.8	4.00	
Viroqua	105	53	74.4	0.77	
Wakeeney	95	49	73.4	3.50	
Wakeeney (near)				3.70	
Wallace	97	50	71.2	2.40	
Walnut	93	54	76.8	4.42	
Wamego*[1]	96	58	75.8	3.21	
Winfield	96	56	76.6	5.11	
Kentucky.					
Alpha	92	50	74.2	4.43	
Anchorage	96	48	73.4	4.90	
Bardstown	100	51	76.8	4.04	
Beattyville	96	48	73.8	7.59	
Beaver Dam	98	50	75.4	1.40	
Berea	94	47	74.2	6.66	
Blandville	95	54	76.1	3.59	
Bowling Green	100	52	77.0	4.22	
Burnside	94	48	73.6	4.30	
Cadiz	98	50	76.5	4.38	
Calhoun	101	52	77.8	3.08	
Catlettsburg	93	50	73.0	5.16	
Earlington	97	49	76.6	4.32	
Edmonton	97	47	74.5	5.59	
Eubank	93	48	70.9	6.11	
Falmouth				5.65	
Farmers	95	47	73.0	3.28	
Frankfort	92	50	74.1	7.65	
Franklin	95	53	76.8	5.05	
Greensburg	100	48	75.0	3.69	
High Bridge	97	53	75.8	3.07	
Hopkinsville	99	50	76.1	5.42	
Irvington	96	55	75.8	3.73	
Jackson	98	49	76.7	2.74	
Leitchfield	94	50	74.2	5.52	
Loretto	98	46	75.4	4.60	
Manchester	95[e]	45[e]	74.9[e]	4.28	
Marion	96	55	76.5	2.07	
Mayfield	96	52	76.4	2.44	
Maysville	98	50	74.6	6.53	
Middlesboro	92	45	72.6[f]	5.83	
Mount Sterling	95	48	74.2	6.00	
Owensboro	94	53	75.8	2.83	
Owenton	106	54	76.9	4.10	
Paducah	101	57	79.9	2.18	
Richmond	96	50	74.6	3.15	
St. John	93	49	73.2	4.85	
Scott	96	49	73.2	3.80	
Shelby City	94	45	72.7	4.49	
Shelbyville	104	47	75.2[e]	6.03	
Taylorsville	98	48	74.8	5.52	
West Liberty	95	45	72.8	4.40	
Williamsburg	91	43	74.0	4.87	
Williamstown	91	51	71.2	4.77	
Louisiana.					
Abbeville	100	66	81.7	16.10	
Alexandria	101	64	82.7	8.43	
Amite	96	64	81.2	4.10	
Baton Rouge	98	65	80.8	5.25	
Burnside	95	65	80.2	4.26	
Calhoun				3.77	
Cameron	91	71	82.4	13.62	
Caspiana	98	67	81.4	2.87	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Louisiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cheneyville	98	64	81.0	7.46	
Clinton	94	63	79.5	5.94	
Collinston	100	65	81.2	7.12	
Covington	97	64	81.1	5.89	
Donaldsonville	100	66	82.3	7.05	
Farmerville	95	66	80.7	5.85	
Franklin	97	67	81.8	11.70	
Georgetown	96	63	79.8	5.25	
Grand Coteau	97	65	81.4	12.46	
Hammond	96	54	80.6	6.19	
Houma	97	62	80.8	7.12	
Jennings	95	66	81.1	10.73	
Lafayette	98	65	81.0	18.52	
Lake Charles	98	67	81.1	8.06	
Lakeside	96	68	81.2	11.01	
Libertyhill	100	62	80.8	7.82	
Logansport				5.02	
Mansfield	96	61	79.1	8.25	
Melville	96	65	80.4	6.58	
Minden	100	65	81.8	3.50	
Monroe	99	62	82.0	3.94	
Morgan City				6.46	
New Iberia	92	68	80.6	12.75	
Opelousas	98	60	81.8	9.97	
Plain Dealing	96	64	80.0	11.39	
Port Eads	89	71	80.0	2.88	
Rayne	98	65	81.6	14.13	
Reserve	102	68	81.3	4.77	
Robeline	97	63	80.6	3.92	
Ruston	99[e]	61[e]	81.2[e]	7.99	
St. Francisville				4.50	
Schriever	98	62	81.9	4.76	
Simmesport				8.64	
Southern University				3.82	
Sugar Experiment Station	97	65	82.4	3.76	
Sugartown	95	67	81.2	6.13	
Venice				2.67	
Maine.					
Bar Harbor	84	32	56.4	4.54	
Chesuncook	89	27	59.0	1.65	
Cornish	91	37	62.2	4.12	
Danforth				1.80	
Fairfield	90	36	61.9	3.49	
Farmington	89	33	61.2	3.60	
Gardiner	91	35	61.5	4.83	
Grant Farm				2.66	
Houlton	82	29	59.6	1.50	
Lewiston	88	39	62.2	4.12	
Madison	86	33	60.2	4.65	
Mayfield	84	33	59.4	3.39	
Millinocket	92	28	60.3	2.41	
North Bridgton	92	37	62.2	5.50	
Oquossoc	95	30	59.2	3.06	
Orono	87	32	60.6	3.13	
Rumford Falls	89	35	61.8	4.15	
The Forks				4.33	
Thomaston	80	30	57.0	3.64	
Vanburen	94	27	58.8	3.27	
Winslow	89	33	61.0	3.39	
Maryland.					
Annapolis	95	52	73.1	7.61	
Bachmans Valley	93	41	68.6	6.42	
Boettcherville	102	41	73.0	1.80	
Cambridge	95	48	73.4	2.41	
Cheltenham	94	47	70.6	5.91	
Chestertown	92	48	70.8	4.27	
Chewsville	96	40	70.2	6.65	
Clearspring	92[j]	45[j]	68.0[j]	3.63	
Coleman	93	50	71.6	3.33	
Collegepark	94	41	69.8	3.77	
Colora		—		3.83	
Cumberland				3.07	
Darlington	90	46	71.6	5.17	
Denton	96	44	71.3	2.74	
Easton	90	48	71.0	3.70	
Fallston	92	48	69.3	3.89	
Frederick	93	47	71.8	5.47	
Grantsville	92	35	66.3	3.38	
Greatfalls	98	44	72.0	4.06	
Greenspring Furnace	95	42	71.0	4.12	
Hancock	98	42	72.5	5.80	
Harney				6.13	
Jewell	92	50	71.6	2.71	
Johns Hopkins Hospital	95	53	73.4	4.36	
Keedysville	98	43	72.4	6.30	
Laurel	95	49	72.1	4.88	
Mount St. Marys College	92	50	72.2	5.60	
New Market	90	44	70.4	5.60	
Oakland	87	33	65.6	4.87	
Pocomoke City	92	47	72.4	3.69	
Porto Bello	94	50	73.8	5.42	
Prince Fredericktown	97	46	72.0	3.19	
Princess Anne	89	43	70.3	2.59	
Solomons	94	56	73.6	3.06	
Sudlersville	95	46	72.6	4.38	
Takoma Park	93	46	71.2	3.63	
Van Bibber	90	48	70.4	5.51	
Westernport	94	42	69.8	5.28	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Woodstock	81	45	71.9	4.68	
Massachusetts.					
Amherst	90	36	64.2	2.86	
Bedford	85	38	62.4	4.86	
Bluehill (summit)	87	42	63.1	4.56	
Cambridge	90	40	65.6	4.30	
Chestnuthill	92	38	64.8	5.38	
Concord	89	35	63.2	5.27	
East Templeton [1]	91	42	63.7	3.82	
Fall River	83	43	63.6	5.64	
Fitchburg	88	38	64.4	5.60	
Framingham	90	35	64.0	5.03	
Groton	88	35	62.8	5.33	
Hyannis				5.78	
Jefferson				5.74	
Lawrence	90	39	64.6	5.96	
Leominster				4.84	
Lowell	88	39	65.5	5.18	
Ludlow Center	85	34	60.1	3.55	
Middleboro	87	33	62.8	7.26	
Monson	87	36	63.9	6.00	
New Bedford	80	43	62.8	6.77	
Plymouth [1]	87	45	62.4	8.65	
Princeton				4.44	
Provincetown	80	39[d]	61.2[b]	2.26	
Salem				6.42	
Somerset [1]	93	40	65.8	7.71	
Sterling				4.17	
Taunton	86	34	62.6	7.82	
Webster				3.84	
Westboro	90	35	66.0	6.20	
Weston	89	35	62.6	4.38	
Williamstown	86	38	62.9	5.74	
Winchendon				8.37	
Worcester	90	43	65.6	4.73	
Michigan.					
Adrian	92	43	68.4	6.80	
Agricultural College	89	43	66.2	7.47	
Allegan	92[f]	40[f]	66.2[f]	3.55	
Alma	89	40	65.4	6.01	
Ann Arbor	90	42	66.9	4.32	
Arbela	88	41	67.0	4.40	
Baldwin	90	38	66.0	3.53	
Ball Mountain	86	38	64.7	6.45	
Baraga	80	29	55.2	4.75	
Battle Creek	89	40	68.5	5.45	
Bay City	86	45	64.7	6.88	
Benzonia	84[j]	37[j]	59.1[j]	1.84	
Berlin	88	38	64.5	4.16	
Big Rapids	88	35	63.1	5.03	
Birmingham	87	41	65.8		
Bloomingdale	92	41	67.2	3.20	
Calumet	79	39	57.6	5.44	
Carsonville	87[j]	38[k]	64.0[k]		
Cassopolis	90			1.70	
Charlevoix	86[d]	40[b]	60.1[c]	2.82	
Charlotte	90	44	67.0	5.06	
Chatham	84	32	56.8	4.15	
Cheboygan	88	33	61.6	2.46	
Clinton	89	42	67.0	4.52	
Coldwater	90[c]	44[c]	68.0[c]	3.50	
Concord	89	45	66.2	6.65	
Deer Park	82	36	53.8	1.91	
Detour	77	39	58.5	5.12	
Dundee	89	42	67.2	4.76	
Eagle Harbor	79	34	53.7	3.56	
East Tawas	86[d]	40[d]	61.6[d]	2.72	
Fitchburg	89	41	66.2	6.45	
Flint	87	39	65.0	4.43	
Frankfort	83	39	60.1		
Gladwin	98	33	64.7	1.30	
Grand Haven	93	42	63.0	4.88	
Grand Marais	78	39	51.4	3.23	
Grape	89	42	66.7	4.32	
Grayling	88	35	64.2	2.50	
Hagar	94	37	65.2	2.47	
Harbor Beach	86	40	61.9	2.42	
Harrison	90	40	65.7	2.80	
Harrisville	81	40	60.0	3.39	
Hart [1]	88	40	65.3		
Hastings	92	43	66.8	5.88	
Hayes	88	40	64.6	2.43	
Highland				7.01	
Hillsdale	89	45	67.2	4.78	
Howell	88	41[c]	65.1[b]	5.27	
Humboldt	83	28	56.8	2.05	
Iron Mountain	87	37	61.1	4.28	
Iron River	84	33	60.2	8.15	
Ironwood	83	37	60.0	5.30	
Ivan	88	35	62.9	1.67	
Jackson	94	45	69.0	5.31	
Jeddo	86	40	64.0	4.94	
Kalamazoo	91[c]	46[c]	68.1[c]	4.39	
Lake City		46		2.70	
Lansing	89	44	66.8	6.69	
Lapeer	90			4.80	
Ludington	82	38	61.7	4.60	
Mackinac Island	82	40	58.2	8.60	
Michigan.—Cont'd.					
Mackinaw City	87	32[d]	61.9[b]	1.20	
Mancelona	90	32	61.0	3.05	
Marine City	88	40	65.2	3.72	
Menominee	87	44	62.2	6.29	
Midland	90	37		6.60	
Montague	86[c]	39[c]	63.8[c]	7.89	
Muskegon	92	40	65.0	8.05	
Old Mission	87	40	61.5	3.37	
Olivet	89	45	67.0	7.57	
Omer				2.18	
Ovid	87	43	66.2	6.85	
Owosso	100[b]	43[d]	67.8[d]	7.48	
Plymouth[b]	93				
Port Austin	87[j]				
Powers	87	31	61.5		
Reed City	99	33	63.9	4.67	
Saginaw (W. S.)	91	43	66.8	4.24	
St. Ignace	80	35	59.2		
St. Johns	90	42	67.2	7.25	
St. Joseph	90	48	66.0	1.09	
Slocum	88	34	65.0	8.28	
Somerset	86	42	65.8	7.82	
South Haven		42		2.90	
Stanton	89	40	64.8		
Thomaston	85	30	58.0		
Thornville	87	44	67.6	5.65	
Traverse City	84	39	60.6	2.25	
Vassar	89	40	66.8	4.36	
Wasepi	88	42	66.2	2.56	
Webberville	89	42	66.2	8.19	
West Branch	78[j]	38[k]	59.2[k]		
Wetmore	86	24	55.2	3.30	
Whitefish Point	78	31	51.8	1.89	
Ypsilanti	87	42	64.6	6.70	
Minnesota.					
Albert Lea	91	44	67.8	3.75	
Alexandria	84	40	62.8	7.02	
Amboy	92[c]	40[d]	67.7[d]		
Angus	82	37	59.0	4.69	
Ashby	85	42	62.2	7.78	
Beardsley	86[b]	35	61.3[d]	3.11	
Beaulieu	87	33	60.8	5.50	
Bemidji	90	32	61.8	9.58	
Bird Island	89	41	65.6	8.07	
Caledonia	92	45	65.5	5.71	
Campbell	85	40	62.2	3.84	
Collegeville	82[c]	44	64.2[c]	4.44	
Crookston	82	41	60.5	2.84	
Detroit	80	33	59.6	5.18	
Faribault	88	42	64.6	5.77	
Farmington	86	44	64.8	5.40	
Fergus Falls	83	43	62.0	4.74	
Glencoe	90	37	62.1	7.05	
Grand Meadow	90	41	65.0	5.44	
Hallock	82	36	58.4	4.65	
Hinckley	84	38	60.4	5.39	
Hovland	70	36	52.0	4.65	
Lake Winnibigoshish	86	35	60.2	7.77	
Leech	84	33	58.2	7.15	
Long Prairie	85	37	62.9	9.80	
Luverne	90	31	64.8	8.09	
Lynd	91	40	64.7	5.95	
Mankato				5.14	
Mapleplain	87	43	65.0	9.60	
Milaca				6.21	
Milan	92	36	63.5	6.32	
Montevideo	91	38	65.0	6.90	
Mora	85	39	61.2	6.68	
Morris	88	40	62.4	5.14	
Mount Iron	86	36	59.6	7.45	
New London	86	42	64.1	6.85	
New Richland	90	41	66.4	4.67	
New Ulm	95	43	67.4	8.92	
Park Rapids	85	38	60.2	8.11	
Peterson				5.80	
Pine River	83	33	58.0	9.62	
Pipestone	88	40	65.8		
Pokegama Falls	86	34	59.5	9.16	
Pratt	88	39	64.4	7.37	
Redwing				7.40	
Reeds				5.02	
Rolling Green	86	41	66.2	5.56	
St. Charles	87	45	66.2	7.10	
St. Cloud	85	38	64.0	7.42	
St. Peter	95	42	67.2	6.40	
Sandy Lake Dam	83	39	59.8	8.77	
Shakopee	89	45	65.7	7.07	
Stillwater				7.60	
Tonka				7.37	
Wabasha	92	47	67.6	5.46	
Wadena	86	35	60.8	7.91	
Willow River	84	38	57.7	5.46	
Winnebago	93	42	67.5	2.42	
Winona	87	49	66.4	6.46	
Worthington	91	35	63.4	4.21	
Zumbrota	88	40	64.6	5.60	
Mississippi.					
Aberdeen	100	58	80.3	5.88	
Mississippi—Cont'd.					
Agricultural College	97	52[j]	79.6[c]	6.12	
Austin	99	58	78.2	5.91	
Batesville	96	57	79.2	3.10	
Bay St. Louis	96	66	80.9	2.74	
Biloxi	96	69	83.2	2.06	
Booneville	93	57	77.5	5.94	
Brookhaven	98	61	80.8	4.40	
Canton	95	59	79.6	6.82	
Columbia	99	61	81.4	4.81	
Columbus	102	57	79.6	6.45	
Corinth	90	56	76.2	9.75	
Crystal Springs	96	62	80.4	1.94	
Duck Hill	97	59	78.4	8.18	
Edwards	94	59	78.2	5.57	
Enterprise				4.53	
Fayette	93	57	77.6	7.73	
Fayette (near)				5.86	
Greenville *a*	97	61	80.9	6.12	
Greenville *b*	100	62	81.2	5.91	
Greenwood	96	59	78.9	6.61	
Hattiesburg				1.80	
Hazlehurst	95	63	79.4	4.63	
Hernando	96	58	77.6	7.95	
Holly Springs	95	57	78.6	4.27	
Indianola	95	63	79.3	6.30	
Jackson	97	60	80.4	2.18	
Kosciusko	98	56	79.4	2.83	
Lake	96	55	79.0	5.32	
Lake Como	100	59	80.1	5.79	
Laurel	99	57	80.8	4.45	
Leakesville	98	60	81.6	3.09	
Leland				9.43	
Louisville	94	57	78.0	4.67	
McNeill	98	64	81.6	5.55	
Magnolia	102	63	82.0	2.24	
Merrill				4.21	
Natchez	97	69	81.2	4.93	
Nitta Yuma	99	60	80.4	4.57	
Patmos				5.51	
Pearlington	97	64	80.6	4.95	
Pecan	98	63	81.8	2.33	
Pittsboro	97	56	78.8	3.58	
Pontotoc	92	57	76.3	5.03	
Port Gibson	97	60	80.3	4.78	
Porterville	97	54	78.6	5.58	
Quitman	95	56	79.3	3.50	
Shelby	101	57	80.4	6.52	
Shoccoe	97	62	80.4	5.45	
Shubuta				3.15	
Stonington				7.00	
Suffolk	97	61	80.0	5.93	
Swan Lake	97	58	79.8	5.66	
Tchula	97	61	80.0	3.60	
Tupelo	97	54	79.0	3.17	
University	95	56	78.7	4.46	
Utica	95[d]	63[d]	80.0[d]		
Walnutgrove	93[d]	57[d]	77.8[d]	3.59	
Walthall				5.23	
Watervalley	96	55	77.0	6.50	
Waynesboro	94	57	78.8	4.36	
Woodville	98	63	81.4	7.77	
Yazoo City	98	60	80.4	5.77	
Missouri.					
Albany				2.08	
Appleton City	94	53	76.2	2.95	
Arlington				1.19	
Arthur	93	51	75.8	3.28	
Avalon	97	51	73.9	2.63	
Bagnell				1.90	
Bethany	90	45	71.0	2.55	
Birchtree	94[c]	53[c]	75.6[c]	2.04	
Blue Springs	96[c]	51[d]	74.2[d]	1.23	
Boonville				1.09	
Bourbon	99	49	75.8	4.35	
Brunswick	96	53	75.4	1.65	
Cape Girardeau				5.05	
Caruthersville	98	55	78.1	4.93	
Conception	92	50	73.0	2.26	
Darksville	98	52	75.0	2.92	
Dean	92	59	75.6	4.07	
De Soto	99	50	75.4	1.07	
Doniphan	96	49	76.2	3.73	
Downing				5.21	
Eldorado Springs	94	53	76.0	3.43	
Fairport				4.47	
Fayette	97	49	74.2	1.67	
Fulton	96	46	75.8	2.04	
Gallatin [1]	94	56	75.8	2.27	
Gano	98	47	75.5	3.65	
Glasgow	98	54	76.6	0.74	
Goodland	94	48	72.2	4.75	
Gorin				3.35	
Grant City	94	50	72.4	3.11	
Harrisonville	96	52	76.1	2.64	
Hazlehurst				2.95	
Hermann				2.23	
Houston	96	44	74.8	2.02	
Huntsville	101	54	76.8	2.60	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ironton	100	42	74.5	3.51	
Jackson	99	48	75.9	3.02	
Jefferson City	99	49	76.1	1.10	
Joplin	90	53	76.6	4.92	
Kidder	95	53	73.5	1.75	
Koshkonong	97	57	75.4	3.27	
Lamar	92	52	76.4	2.39	
Lamonte	.....	.....	.....	3.68	
Lebanon	94	52	75.5	4.39	
Lexington	96	53	76.2	1.09	
Liberty	97	50	74.8	2.61	
Lockwood	90	52	74.4	5.20	
Louisiana	100	45	75.6	1.21	
Macon	99	53	75.7	6.88	
Marblehill	101	51	75.8	2.77	
Marshall	99	50	75.9	3.75	
Maryville	94	50	72.8	3.35	
Mexico	102	49	76.2	2.09	
Monroe	101	50	74.2	3.68	
Montreal	96	46	75.0	2.25	
Mountaingrove	92	49	73.6	3.12	
Mount Vernon	98	49	75.9	3.26	
Neosho	91	48	75.3	4.39	
New Haven	101	52	77.2	3.30	
New Madrid	.....	.....	....	5.88	
New Palestine	100	53	76.8	3.31	
Oakfield	98	53	75.9	3.54	
Olden	96	47	75.8	3.89	
Oregon	92	51	73.6	2.00	
Osceola	.....	.....	.....	2.98	
Pine Hill	.....	.....	.....	2.63	
Princeton	98	52	75.4	5.42	
Protem	95	53	76.0	1.47	
Rockport	.....	.....	.....	2.51	
Rolla	.....	.....	.....	2.51	
St. Charles	100	52	76.2	1.23	
St. Joseph	.....	.....	.....	1.50	
Sarcoxie	.....	.....	.....	3.49	
Sedalia	97	52	76.6	4.32	
Seymour	92	50	73.8	2.60	
Sikeston	95	59	75.0	6.76	
Steffenville	99	48	74.4	1.95	
Sublett	93	51	73.8	6.27	
Trenton	93	55	74.4	2.46	
Unionville	96	51	73.2	3.98	
Versailles	103	49	77.4	4.30	
Vichy	98	45	75.7	2.65	
Warrensburg	99	54	77.4	2.41	
Warrenton	101	55	75.9	0.92	
Warsaw	95	47	74.9	3.57	
Wheatland	.....	.....	.....	2.16	
Willowsprings	98	44	73.6	3.37	
Zeitonia	101	44	75.0	3.83	
Montana.					
Absarokee	.....	.....	.....	4.07	
Adel	80	25	52.0	3.87	3.0
Alzada	.....	.....	.....	1.12	
Anaconda	80	32	52.9	1.49	
Augusta	83	30	53.8	4.97	
Billings	94	37	61.8	5.31	
Boulder	81	32	53.6	3.84	
Bozeman	78	32	52.8	2.62	
Butte	77	34	53.5	3.15	
Canyon Ferry	90	37	58.3	1.74	
Cascade	88	33	58.4	5.48	
Choteau	84	31	55.6	2.63	
Clearcreek	85	31	57.2	2.05	
Columbia Falls	89	28	55.6	2.23	
Copper	.....	.....	.....	3.08	0.5
Crow Agency	90	35	61.6	6.15	
Culbertson	90	36	59.6	2.66	
Dayton	80	43	60.4	3.95	
Decker	90	34	59.8	3.56	
Deerlodge	80[m]	28	54.8[x]	.....	
Dillon	80	30	55.8	3.96	T.
Ekalaka	91	38	60.4	3.33	
Fallon	93	41	62.2	4.12	
Forsyth	94	41	62.1	3.49	
Fort Benton	86	34	58.0	1.90	
Fort Harrison	82	35	56.4	.....	
Fort Logan	80	25	51.1	.....	
Gold Butte	.....	.....	.....	3.89	
Graham	92	37	61.0	3.17	
Grayling	72	24	47.5	1.75	T.
Greatfalls	88	35	58.0	4.23	
Hamilton	83	37	57.0	2.37	
Harlem	88[o]	34[o]	59.5[o]	2.06	
Hayden (near)	87	35	58.2	2.00	
Highwood	.....	.....	.....	4.85	
Homepark	.....	.....	.....	1.14	
Jordan	87	35	59.2	.....	
Lakeview	.....	.....	.....	2.20	
Lame Deer	90	34	58.6	3.23	
Lewistown	85	32	55.5	4.50	0.5
Livingston	84	34	56.6	3.12	T.
Lodgegrass	90[x]	33[x]	59.2[x]	3.68	T.
Malta	88	37	60.2	3.80	
Marysville	.....	.....	.....	5.26	
Missoula	90	36	58.8	3.48	
Neihart	.....	.....	.....	3.05	
Nye	.....	.....	.....	5.15	5.8
Ovando	82	28	52.3	3.23	
Parrot	82	32	57.8	2.74	
Philipsburg	87	30	54.6	4.05	T.
Plains	80	34	55.9	3.57	
Poplar	90	36	61.2	3.73	T.
Redlodge	80	31	52.0	4.86	3.0
Ridgelawn	92	36	61.7	5.77	
St. Peter	77	31	52.7	7.86	1.0
Saltese	.....	.....	.....	3.45	
Springbrook	90	34	60.1	7.65	
Steele	83	38	57.6	4.79	
Toston	85	34	59.1	1.78	
Townsend	.....	.....	.....	1.40	
Troy	89	33	57.9	2.19	
Twin Bridges	82	30	55.0	2.50	
Utica	79	32	53.2	2.82	T.
Virginia City	81	30	54.8	1.52	
Warrick	.....	.....	.....	2.17	T.
Whitlash	.....	.....	.....	2.23	
Wolf Creek	84	31	54.3	5.47	T.
Wolf Point	.....	.....	.....	6.21	
Wolsey	78	23	48.8	2.28	T.
Yale	83	32	55.2	2.97	
Nebraska.					
Agate	89	38	61.8	4.71	
Agee[s1]	96	50	67.7	3.58	
Albion	91	42	68.6	4.68	
Alliance	91	41	65.2	3.69	
Alma	93	48	72.4	5.66	
Ansley	91	45	67.2	5.74	
Arapaho	.....	.....	.....	6.55	
Arcadia	.....	.....	.....	6.88	
Ashland	94	52	72.4	2.54	
Ashton	.....	.....	.....	7.18	
Auburn	95	46	71.8	3.51	
Aurora	93	48	70.0	5.29	
Bartley	96	48	72.1	4.97	
Beatrice	.....	.....	.....	3.41	
Beaver	93	50	71.6	8.09	
Bellevue	.....	.....	.....	2.55	
Benkleman	.....	.....	.....	3.10	
Bethany	.....	.....	.....	4.50	
Blair	93	43	70.5	1.71	
Bluehill	.....	.....	.....	6.20	
Bradshaw	.....	.....	.....	8.83	
Bridgeport	90	44	66.8	2.72	
Broken Bow	94	44	68.0	8.26	
Burchard	.....	.....	.....	2.46	
Burge	.....	.....	.....	6.95	
Burwell	.....	.....	.....	6.14	
Callaway	92	44	68.0	6.21	
Central City	.....	.....	.....	5.95	
Chester	.....	.....	.....	3.50	
Clearwater	91	44	68.2	.....	
Cody	.....	.....	.....	2.49	
Columbus	95	47	69.4	3.90	
Crawford	.....	.....	.....	3.69	
Crete	92	50	72.4	3.20	
Culbertson	98	48	70.5	4.35	
Curtis	93	48	70.0	8.95	
David City	91	47	69.3	5.02	
Dawson	99	50	75.8	2.53	
Duff	.....	.....	.....	3.32	
Dunning	.....	.....	.....	3.85	
Edgar	.....	.....	.....	4.43	
Ericson	.....	.....	.....	6.90	
Ewing	.....	.....	.....	4.87	
Fairbury	95	45	72.6	3.31	
Fairmont	93	47	69.7	2.84	
Fort Robinson	81	40	56.4	2.44	
Franklin	93[c]	47[c]	71.4[c]	4.88	
Fremont	93	45	70.8	3.93	
Fullerton	.....	.....	.....	6.17	
Geneva	93	49	71.6	4.34	
Genoa (near)	93	45	70.3	2.44	
Gering	90	45	66.2	4.53	
Gordon	.....	.....	.....	9.20	
Gothenburg	92	45	69.8	8.60	
Grand Island	96	51	71.9	8.97	
Grant	94	44	68.2	5.03	
Greeley	.....	.....	.....	8.85	
Guide Rock	.....	.....	.....	4.67	
Halsey	95	45	6.78	4.18	
Hartington	92	40	66.4	5.05	
Harvard	90	46	69.4	3.66	
Hastings[s1]	92	57	71.0	7.51	
Hayes Center	.....	.....	.....	4.87	
Hay Springs	91	40	62.8	4.85	
Hebron	93	48	71.8	4.80	
Hendley	.....	.....	.....	5.95	
Hickman	.....	.....	.....	4.27	
Holdrege	91	43	70.0	11.83	
Holly	.....	.....	.....	5.55	
Hooper[s1]	96	50	71.1	2.44	
Imperial	92	44	67.5	4.78	
Kearney	91	50	69.5	8.17	
Kennedy	95	37	65.8	7.52	
Kimball	89	44	64.4	4.10	
Kirkwood	92	44	66.1	6.49	
Leavitt	94	46	71.2	3.63	
Level	.....	.....	.....	6.43	
Lexington	92	46	67.4	6.34	
Lodgepole[d]	84	42	64.2	.....	
Loup	92	45	68.4	10.32	
Lynch	97	44	69.7	4.57	
McCool	.....	.....	.....	4.19	
Madison	92	45	68.7	2.30	
Marquette	.....	.....	.....	7.32	
Mason	.....	.....	.....	5.65	
Merriman	.....	.....	.....	6.63	
Minden	90	48	69.1	4.86	
Monroe	.....	.....	.....	3.95	
Nebraska City	94	53	73.2	3.56	
Nemaha	.....	.....	.....	2.10	
Norfolk	95	45	70.2	4.43	
North Loup	92	44	68.5	10.17	
Oakdale	94	43	68.7	5.70	
Odell	.....	.....	.....	2.77	
Ord	.....	.....	.....	6.78	
Osceola	.....	.....	.....	6.50	
Palmer	.....	.....	.....	6.46	
Palmyra[s1]	96	58	72.9	4.00	
Pawnee City	97	48	73.2	2.01	
Plattsmouth	.....	.....	.....	4.20	
Plymouth	92	49	72.8	4.85	
Purdum	93	42	66.2	2.25	
Ravenna	92	47	69.6	4.76	
Redcloud	92	50	70.4	5.34	
Republican	.....	.....	.....	9.60	
Rulo	.....	.....	.....	2.18	
St. Libory	.....	.....	.....	6.27	
St. Paul	95	48	70.4	8.41	
Santee	96	45	68.4	4.71	
Schuyler	.....	.....	.....	5.38	
Seneca	.....	.....	.....	3.27	
Seward	92	50	70.8	3.25	
Smithfield	.....	.....	.....	8.34	
Springview	91	40	65.0	8.85	
Stanton	94	51	70.4	4.02	
Strang	.....	.....	.....	5.42	
Stratton	.....	.....	.....	4.87	
Stromsburg	.....	.....	.....	6.50	
Superior	97	52	71.7	4.10	
Syracuse	.....	.....	.....	2.90	
Tablerock	.....	.....	.....	3.86	
Tecumseh	96	40[e]	72.0[e]	3.99	
Tekamah	94	46	70.9	2.75	
Turlington	95	49	72.2	2.65	
University Farm	93	49	72.7	3.59	
Wahoo	.....	.....	.....	3.14	
Wakefield	95	41	68.6	3.98	
Wallace	.....	.....	.....	5.10	
Wauneta	.....	.....	.....	4.35	
Weeping Water	.....	.....	.....	3.71	
Westpoint	93	42	69.4	4.44	
Whitman	.....	.....	.....	5.18	
Wilber	.....	.....	.....	6.15	
Wilsonville	.....	.....	.....	3.36	
Winnebago	93	45	68.2	3.78	
Wisner	.....	.....	.....	1.70	
Wymore	.....	.....	.....	2.94	
York	.....	.....	.....	5.52	
Nevada.					
Amos	90	29	59.2	0.23	
Austin	82	34	56.8	0.03	
Belmont	83	35	59.8	0.09	
Beowawe[s1]	91	48	66.0	T.	
Carlin[s1]	90	48	66.7	.....	
Carson City	87	30	59.5	T.	
Dyer	95	35	62.3	0.00	
Eureka	92	29	60.2	0.07	
Geyser	90	28	58.2	0.15	
Hawthorne	99	40	68.3	0.00	
Hazen	94	.....	.....	0.13	
Humboldt	92	34	64.4	T.	
Lewers Ranch	85	33	60.5	0.10	T.
Lovelocks	95	34	62.0	0.00	
Martins	95	34	64.5	0.70	
Morey	89[j]	31[j]	59.4[j]	0.00	
Palisade	86	33	59.6	0.00	
Palmetto	88	26	58.0	T.	
Pioche	101	27	63.8	0.00	
Potts	93	24	57.8	0.05	T.
Reno State University	88	35	60.8	0.00	
San Jacinto	87	50	57.8	1.48	
Sodaville	98	43	71.0	0.00	
Tecoma	96	36	64.0	0.10	
Wabuska	95	32	64.0	T.	
Wadsworth	93	37	62.8	0.00	
Wells[s1]	90	30	60.4	.....	
Wood	85	33	58.2	0.53	
New Hampshire.					
Bartlett	.....	.....	.....	4.29	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New Hampshire—Cont'd.	°	°	°	*Ins.*	*Ins.*
Berlin Mills	88	31	57.9	4.08	
Bethlehem	84	34	60.0	5.54	T.
Bretton Woods				3.82	
Brookline[●1]	90	35	65.1	8.10	
Durham	91	30	60.9	3.72	
Franklin Falls	95	33	63.4	3.27	
Grafton	88	32	60.9	3.79	
Hanover	90	35	62.2	5.15	
Jefferson Highlands				4.14	
Keene	90	34	63.0	3.58	
Littleton	85	34	61.0	4.14	
Nashua	92	37	64.9	5.01	
Newton	89	31	61.8	4.55	
North Woodstock				2.43	
Plymouth	94	33	62.8	4.66	
Stratford	94	61	61.4	3.30	
New Jersey.					
Asbury Park	91	47	66.6	2.80	
Bayonne	91	49	68.5	4.20	
Belvidere	94	43	68.5	2.78	
Bergen Point	89	48	67.8	3.78	
Beverly	94	46	69.5	2.24	
Bridgeton	93	46	72.4	4.51	
Browns Mills				4.72	
Canton				4.20	
Cape May C. H	91	44	68.8	1.67	
Charlotteburg	88	35	64.8	3.40	
Chester	93	43	68.8	3.18	
Clayton	94[d]	41[d]	69.0[d]	3.63	
College Farm	88	45	68.3	1.83	
Dover	90	39	65.8	5.18	
Englewood	88	45	66.6	4.23	
Flemington	95	43	69.4	2.67	
Friesburg	95	43	69.4	5.67	
Hightstown	92	42	68.2	2.53	
Imlaystown	93	47	69.6	1.75	
Indian Mills	96	40	69.6	3.74	
Lakewood	91	44	67.7	4.82	
Lambertville	94	44	70.2	3.21	
Layton	93	36	66.0	2.09	
Moorestown	91	45	68.9	2.93	
Newark	91	47	68.6	3.02	
New Brunswick	94	46	70.2	1.99	
Newton	90	41	66.6	3.69	
Oceanic	90	48	67.0	3.06	
Paterson	90	48	69.1	3.83	
Phillipsburg	96	45	69.6	2.27	
Plainfield	93	43	68.2	2.77	
Pleasantville				3.65	
Rancocas				3.69	
Rivervale	90	37	65.2	5.52	
Salem	96	46	70.4	5.84	
Somerville	93	42	68.6	3.08	
South Orange	90	46	67.6	3.66	
Sussex	91	40	67.2	2.19	
Toms River	94	40[e]	68.4[e]	2.32	
Trenton	91	50	70.2	2.28	
Tuckerton	89	42	68.0	4.27	
Vineland	95	42	68.4	4.86	
Woodbine	92	42	69.2	2.24	
Woodstown				8.71	
New Mexico.					
Alamagordo	103	54	78.2	1.84	
Albert	102	46	74.7	0.81	
Albuquerque	97	45	73.4	1.37	
Alma	98	38	69.0	0.40	
Alto				2.96	
Arbela	94	42	69.4	2.98	
Artesia	102[e]	59[e]	78.7[e]	1.92	
Bellranch	100	51	74.5	0.43	
Bloomfield	97	39	68.9	1.38	
Brice	100	58	78.6	2.41	
Cambray				0.50	
Carlsbad	102	59	79.8	2.06	
Chama				0.99	
Cimarron	91	39	64.8	0.52	
Cliff	102	41	73.7	0.15	
Cloudcroft	78	40	56.0	1.12	
Colmor	83	57	69.7	1.28	
Deming	102	50	77.3	1.05	
Dorsey	97	41	67.6	1.58	
Eagle Rock Ranch	87	42	64.2	2.16	
Elizabethtown	83	28	55.9	0.76	
Elk	87[e]	49	67.2[e]	2.87	
Espanola	94	42	68.4	1.62	
Estancia	94	40	66.8	1.13	
Fairview	104[i]	31[i]	71.5[i]	2.50	
Fort Bayard	97	47	71.0	0.75	
Fort Stanton	92	44	66.6	2.79	
Fort Union	96	40	64.2	1.50	
Fort Wingate	87	43	66.6	1.50	
Fruitland	95	42	68.6	0.95	
Gage				0.62	
Gran Quivira				1.49	
Hillsboro				2.41	
Laguna	98	47	71.0	1.30	
Lake Valley				2.91	
Las Vegas	95	42	67.0	1.56	
Lordsburg	105	50	78.4	0.56	
Los Alamos				2.40	
Los Lunas	96	48	74.6	0.75	
Luna	94	29	63.0	0.05	
Magdalina				1.40	
Manuelito				0.38	
Mesilla Park	103	51	77.8	0.58	
Mimbres				0.92	
Mineral Hill				1.42	
Mountainair	96	34	66.4	1.11	
Portales	95	50	74.8	1.97	
Raton	95	36	64.7	0.10	
Redrock				0.40	
Rincon	102[h]	51	77.7[g]	2.50	
Rosa				1.06	
Rosedale				2.05	
Salado				4.37	
San Marcial				0.60	
San Rafael	97	40	68.6	1.29	
Socorro	100	46	75.8	1.73	
Springer	97	41	68.8	0.40	
Strauss				2.90	
Taos	93	39	66.2	1.27	
Torrance	91	43	67.2	2.25	
Trampas				2.08	
Tres Piedras	84	33	59.4	0.11	
Tucumcari	99	50	77.2	2.50	
Valley				2.00	
Vermejo	85	35	60.0	1.52	
Weed				3.61	
Whiteoaks				2.23	
Winsors	82	28	55.4	2.48	
New York.					
Adams				7.67	
Addison	92	39	66.3	7.24	
Akron				4.47	
Amsterdam	89	40	64.4	4.27	
Appleton	89	38	63.1	2.68	
Arcade	87	33	62.8	4.44	
Athens	89	43	66.7	2.34	
Atlanta	90	36	64.7	5.57	
Atwater				6.16	
Auburn	90	40	66.0	8.11	
Avon	88	41	63.6	6.07	
Baldwinsville				8.94	
Ballston Lake	88	40	84.2	4.14	
Bedford	90	38	60.8	6.59	
Berlin	89	35	64.1	6.35	
Blue Mountain Lake				11.59	
Bolivar	90	35	63.4	6.49	
Bouckville	85	36	61.0	5.25	
Brockport	94	41	66.6	5.45	
Cape Vincent	84	40	61.1	9.15	
Carmel	88	42	65.2	5.93	
Carvers Falls	89	40	63.2	7.63	
Chatham	91	41	66.5	4.62	
Chazy	89	35	64.0	3.32	
Coeymans	94	42	68.2	4.93	
Cold Spring Harbor	88	43	65.4	3.81	
Cooperstown	84	40	62.4	6.58	
Cortland	87	39	64.6	5.82	
Cutchogue	86	45	66.4	3.49	
Dekalb Junction	87[e]	40[e]	63.9[e]	4.56	
De Ruyter	85	37	62.2	5.64	
Easton				4.75	
Elmira	95	41	67.2	5.66	
Faust	87	33	61.5	10.75	
Fayetteville	91	40	66.9	7.38	
Fort Plain	89	42	66.6	4.21	
Franklinville	87	35	63.2	8.89	
Gabriels	86[e]	22	59.2[e]	5.11	
Gansevoort				5.75	
Glens Falls	88	38	64.0	5.67	
Gloversville	87	39	63.5	6.17	
Greenfield	87	40	63.2	5.04	
Greenwich	86[e]	40[e]	64.8[e]	4.73	
Griffin Corners	87	31	61.0	3.94	
Harkness	86	38	63.4	2.56	
Haskinville				4.92	
Hemlock	87	45	66.0	4.82	
Hunt	91	40	65.2	5.23	
Indian Lake	90	29	60.8	9.00	
Ithaca	88	43	65.4	6.81	
Jamestown	89	35	65.8	4.81	
Jeffersonville	89	34	64.6	3.31	
Keene Valley	90	32	62.1	7.15	
Lake George	88	39	63.0	4.77	
Le Roy	87	42	65.0	5.48	
Liberty	82	39	63.8	3.60	
Littlefalls, City Res	88	42	64.1	8.42	
Lockport				4.40	
Lowville	87	35	62.0	9.97	
Lyndonville				5.06	
Lyons	92	41	67.4	7.98	
Middletown	89	45	67.2	2.52	
Mohonk Lake	82	41	63.6	3.02	
Moira	86	39	64.6	3.66	
Mt. Hope	91	40	66.2	6.04	
Newark Valley				4.47	
New Lisbon	84	32	61.0	5.94	
North Hammond	87	42	64.3	4.05	
North Lake	85	30	57.4	6.56	
Ogdensburg				3.84	
Oswegatchie	86	31	62.2	7.77	
Otto	87	41	64.4	4.58	
Oxford	84	39	64.4	6.34	
Palermo				4.65	
Perry City	91	37	65.0	8.21	
Plattsburg	89	40	64.2	3.12	
Port Jervis	91	42	67.6	2.97	
Potsdam	88	39	64.6	5.57	
Richland	91	36	68.6	4.69	
Richmondville	88	40	64.4	6.51	
Ridgeway	87	42	64.7	5.04	
Ripley	90	41	66.6	7.90	
Romulus	89	41	65.7	7.33	
Salisbury Mills	85	39	64.1	5.55	
Saranac	86	32	61.2	7.49	
Scarsdale	88	44	77.1	2.36	
Setauket	86	44	65.1	3.54	
Shortsville	86	39	64.6	6.18	
Skaneateles				8.61	
Southampton	80	44	63.6	3.31	
South Canisteo	89	38	64.0	5.37	
South Kortright	89	33	62.8	3.74	
South Schroon	88	33	61.6	8.72	
Spier Falls	88	40	64.9	5.15	
Straits Corners				6.46	
Ticonderoga	88	42	65.4	6.13	
Volusia	85	40	63.6	5.98	
Wappinger Falls	89	45	68.2	3.71	
Warwick				3.03	
Watertown	87	41	64.7	7.56	
Waverly	93	38	66.6	4.34	
Wedgwood	88	42	63.6	7.02	
Wells	86	33	62.2	4.93	
West Berne	89	40	64.6	5.53	
Westfield	86	40	64.7	6.25	
Windham	88	35	63.2	3.64	
Youngstown				2.22	
North Carolina.					
Battleboro				4.73	
Bryson City				4.54	
Buck Springs	80	30	63.2	1.12	
Catawba				1.22	
Chapelhill	93[e]	52[e]	76.0[e]	3.37	
Currituck				1.64	
Eagletown	93	48	73.0	5.73	
Edenton	96	46	75.3	2.23	
Fayetteville	95	53	76.2	1.86	
Goldsboro	96	51	76.6	2.54	
Graham				2.93	
Greensboro	96	49	75.6	2.26	
Greenville				6.35	
Henderson	94	52	74.2	4.57	
Hendersonville	87	47	69.6	7.02	
Henrietta	97	50	78.0	1.36	
Horse Cove	83	51	69.4	9.55	
Hot Springs	88	50	73.0		
Jefferson	84	40	69.6	4.49	
Kinston	96	49	77.2	3.99	
Lexington	99	47	76.2	1.38	
Lincolnton	97	49	76.0		
Linville	80	35	64.0	7.74	
Louisburg	94	51	75.4	4.34	
Lumberton	99	49	77.8	2.32	
Manteo	90	50	73.9	0.20	
Moncure	97	50	77.0	2.54	
Monroe	97	46	76.0	0.93	
Morganton	95	46	74.5	3.16	
Mountairy	93	45	73.7	4.12	
Mount Holly				0.70	
Murphy				3.45	
Nashville	96	50	75.9	5.43	
Newbern	93	51	76.0	5.75	
Patterson[●1]	89	44	67.8	6.49	
Pinehurst	98	49	77.6	1.67	
Pink Beds	82	33	64.0	6.20	
Pittsboro	95	50	75.2	3.05	
Ramseur	96	47	76.2	2.44	
Randleman				1.16	
Reidsville	93	49	74.7	2.43	
Salem	94	48	74.4	1.50	
Salisbury	96	44	75.4	1.35	
Saxon	95	46	73.4	1.30	
Scotland Neck	98	51	76.8	6.00	
Selma	99	52	77.2	5.68	
Settle	93	49	75.0	1.49	
Sloan	95	50	75.0	1.41	
Snowhill	96	47	76.4	3.22	
Southern Pines	98	49	77.6	1.74	
Southport	92	57	78.2	3.46	
Statesville	97	50	75.2	1.27	
Tarboro	99	49	78.4	3.66	
Washington	95	47	75.0	5.78	
Waynesville	86	44	68.0	3.86	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Weldon	98	50	76.3	2.79	
Whiteville	97	54	76.1	3.44	
North Dakota.					
Amenia	86	42	61.2	3.70	
Ashley	86	34	59.0	3.56	
Balfour	.....	.....	.....	5.66	
Beriin	87	36	59.2	3.02	
Buford	90	37	60.3	2.48	
Cando	86	32	57.2	3.88	
Churchs Ferry	84	33	58.9	4.72	
Coalharbor	85	38	59.0	6.04	
Cooperstown	86	37	59.0	5.00	
Denhoff	88	39	59.4	4.62	
Dickinson	95	33	59.8	3.75	
Donnybrook	91	35	58.7	4.69	
Edgeley	88	37	60.8	3.48	
Ellendale	85	45	60.2	4.12	
Elmore	92	34	59.6	4.08	
Fargo	85	40	61.1	5.00	
Forman	87	40	62.1	3.44	
Fort Berthold	89	37	61.0	5.34	
Fort Yates	89	39	62.0	2.38	
Fullerton	88	42	60.8	3.37	
Glenullin	89	40	59.8	6.05	
Hamilton	88	33	57.5	5.95	
Hannaford	92[b]	38[c]	60.4[c]	2.84	
Jamestown	85	42	62.0	5.09	
Kulm	90	41	60.8	3.67	
LaFollette	83	35	57.4	4.43	
Lamoure	.....	.....	.....	3.22	
Langdon	82	33	55.9	7.58	
Larimore	87	37	58.2	4.01	
Lisbon	86	36	60.3	5.04	
McKinney	85	32	57.0	4.03	
Manfred	85	37	58.8	3.82	
Mayville	85	40	60.2	5.34	
Medina	85	.....	.....	3.56	
Medora	94	32	61.5	4.31	
Melville	93[c]	37[c]	60.6[c]	5.78	
Milton	86[c]	34[c]	57.8[c]	.....	
Minnewaukon	85[d]	36[d]	59.2[d]	6.53	
Minto	89	37	57.5	4.55	
Moyersville	85	35	58.2	3.52	
Napoleon	90	35	59.5	3.79	
New England	97[b]	38	65.2[d]	3.97	
Oakdale	89	34	59.8	8.17	
Oriska	87	41	61.6	4.06	
Palermo	.....	.....	.....	3.88	
Park River	89	38	59.5	5.53	
Pembina	89	33	58.0	4.46	
Power	86	38	60.8	3.95	
Pratt	87	34	59.1	2.42	
Rolla	90	34	57.8	6.65	
Rugby	87	35	58.7	5.67	
Sentinel Butte	94	40	65.4	3.81	
Steele	91	34	59.8	3.16	
Tioga	86	.....	.....	5.46	
University	83	35	59.8	4.57	
Wahpeton	85	43	63.2	5.20	
Walhalla	86	37	56.0	6.43	
Washburn	89[c]	43[c]	62.2[c]	5.27	
Westhope	88	34	58.0	4.59	
Willow City	85	33	57.0	5.58	
Wishek	86	40	59.6	2.48	
Ohio.					
Akron	89	40	67.8	3.93	
Amesville	96	39	72.2	3.42	
Atwater	.....	.....	.....	6.82	
Bangorville	90	40	68.0	2.83	
Bellefontaine	91	43	68.7	6.05	
Benton Ridge	91	43	70.0	9.27	
Bladensburg	99	37	68.6	2.21	
Bowling Green	88	40	68.0	5.31	
Bucyrus	90	38	68.1	4.87	
Cadiz	91	42	69.6	6.74	
Cambridge	93	37	68.9	6.20	
Camp Dennison	97	47	73.0	2.37	
Canal Dover	92	40	68.4	7.31	
Canton	87	38	67.4	9.09	
Cardington	91	39	67.8	4.04	
Chillicothe	93	45	70.8	5.78	
Circleville	95	46	71.9	6.36	
Clarington	93	43	70.9	6.20	
Clarksville	92	48	72.0	4.25	
Cleveland *a*	85	44	66.4	3.00	
Cleveland *b*	89	45	67.1	2.79	
Coalton	94	43	71.0	6.57	
Colebrook	86	37	64.6	4.28	
Dayton	95	47	71.8	2.46	
Defiance	92	43	68.2	5.33	
Delaware	91	40	68.9	3.62	
Demos	91	41	69.0	3.80	
Findlay	95	42	70.4	7.44	
Frankfort	95	47	71.7	3.92	
Fremont	93	42	69.6	4.90	
Garrettsville	89	36	65.6	3.40	
Granville	90	40	69.5	3.58	
Gratiot	90	40	68.9	4.28	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Green	95	48	72.0	4.59	
Greenhill	88	34	65.6	6.38	
Greenville	95	46	71.1	1.82	
Hedges	91	41	69.0	5.40	
Hillhouse	88	34	64.3	4.43	
Hiram	88	43	67.0	2.71	
Hudson	92	38	67.0	3.62	
Ironton	97	49	73.6	6.79	
Jacksonburg	94	51	71.8	2.99	
Kenton	91	41[c]	67.0[d]	6.00	
Killbuck	89	40	68.2	4.33	
Lancaster	91	43	69.8	5.44	
Lima	90	45	69.6	3.92	
McConnelsville	93	40	69.8	2.82	
Manara	92	46	70.0	5.97	
Mansfield	.....	.....	.....	6.20	
Marietta	90	46	71.1	3.98	
Marion	92	38	69.8	4.62	
Medina	93	35	67.4	2.61	
Milfordton	91	38	68.1	4.12	
Milligan	93	39	69.4	3.39	
Millport	88	35	65.8	6.22	
Montpelier	89	45	67.4	5.29	
Napoleon	90	44	68.6	7.34	
Nellie	88	41	68.6	3.69	
New Alexandria	93	38	69.5	6.10	
New Berlin	92	38	67.3	9.20	
New Bremen	91	43	70.2	1.98	
New Richmond	93	50	73.0	3.65	
New Waterford	98	35	68.4	6.31	
North Lewisburg	95	42	70.6	8.55	
North Royalton	88	38	66.4	2.08	
Norwalk	98	39	68.9	4.71	
Oberlin	91	37	67.2	3.06	
Ohio State University	89	42	69.0	2.11	
Orangeville	90	34	64.8	5.11	
Ottawa	94	43	70.1	3.77	
Pataskala	89	41	69.4	4.92	
Philo	92	43	70.6	3.34	
Plattsburg	91	45	68.8	7.12	
Pomeroy	97	46	72.1	4.68	
Portsmouth	96	52	73.6	4.03	
Pulse	88	51	70.2	3.01	
Rittman	92	35	67.4	5.87	
Rockyridge	91	41	68.7	6.00	
Shenandoah	88	37	66.2	6.56	
Sidney	95	45	71.3	4.71	
Somerset	95	45	71.0	3.82	
South Lorain	90	36	67.0	2.00	
Springfield	.....	.....	.....	5.89	
Thurman	95	47	72.6	4.70	
Tiffin	89	43	68.6	3.68	
Upper Sandusky	89	40	68.5	5.24	
Urbana	91	45	69.2	4.50	
Vickery	91	37	67.8	5.35	
Warren	91	37	67.4	3.96	
Wauseon	91	41	68.0	6.11	
Waverly	97	47	72.6	6.40	
Waynesville	90	47	70.0	6.01	
Wellington	91	38	68.4	2.50	
Willoughby	.....	.....	.....	2.79	
Wilson	94	46	72.0	6.78	
Wooster	89	38	68.0	7.50	
Zanesville	.....	.....	.....	4.49	
Oklahoma.					
Alva	106	55	81.9	0.83	
Arapaho	100	50	78.4	0.91	
Binger	93[d]	58[d]	74.0[d]	2.93	
Busch	97	60	77.4	2.08	
Chandler	97	58	79.4	3.05	
Cloud Chief	95	57	76.0	2.35	
Enid	97	61	78.0	3.65	
Erick	95	58	77.2	0.65	
Fort Reno	93	59	76.6	1.10	
Fort Sill	96	65	79.4	0.87	
Frederick	96	64	80.0	1.90	
Gage	98	59	78.1	1.32	
Grand	98	55	77.0	0.58	
Guthrie	93	61	78.2	2.12	
Harrington	98	56	76.1	1.30	
Hennessey	100	61	78.2	3.21	
Hobart	96	60	78.6	0.77	
Jefferson	100	60	79.6	2.34	
Jenkins	100	61	79.0	1.97	
Kenton	102	53	73.8	3.29	
Kingfisher	96	61	78.8	3.27	
Luther	98[c]	60[c]	78.8[c]	2.86	
McComb	96	58	77.9	1.28	
Mangum	100	59	80.6	1.00	
Meeker	96	54	78.0	3.90	
Newkirk	97	60	78.7	4.14	
Norman	95	60	78.2	1.51	
Okeene	98[b]	61[b]	78.8[b]	3.25	
Perry	98	61	78.0	3.59	
Shawnee	94	59	78.6	1.73	
Stillwater	94	60	77.8	3.76	
Taloga	.....	.....	.....	2.94	
Temple	101	62	81.8	0.63	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Oklahoma—Cont'd.	°	°	°	*Ins.*	*Ins.*
Watonga	98[c]	54[c]	77.6[c]	2.28	
Waukomis	102	61	80.1	3.35	
Weatherford	98	57	77.2	1.93	
Whiteagle	97	60	77.4	7.06	
Woodward	.....	.....	.....	2.00	
Oregon.					
Alba	.....	.....	.....	2.01	
Albany	.....	.....	.....	1.33	
Alpha	85	37	58.4	2.16	
Arlington	92	40	67.3	0.71	
Ashland	86	41	61.1	0.96	
Astoria	68	48	57.1	2.52	
Aurora (near)	80	43	59.5	1.37	
Bay City	68	40	55.0	3.61	
Bend	84	29	55.7	1.29	
Beulah	90	30	55.5	2.10	
Blackbutte	85	41	58.2	2.00	
Blalock	96	.....	.....	0.94	
Bonita	87	41	59.3	3.16	
Bullrun	.....	.....	.....	3.07	
Burns	87	32	58.2	2.45	
Cascade Locks	84	46	62.4	1.08	
Condon	87	39	59.2	2.00	
Coquille	.....	.....	.....	1.07	
Corvallis	83	41	60.2	1.42	
Dale	.....	.....	.....	1.82	
Dayville	84	39	60.6	1.70	
Doraville	79	42	57.6	2.74	
Drain	87	38	60.6	1.31	
Echo	94[c]	45[c]	68.0[c]	1.18	
Ella	93[c]	42[c]	68.8[c]	1.02	
Eugene	81	44	59.9	2.10	
Fairview	74	40	56.5	1.23	
Falls City	83	39	57.3	1.41	
Forestgrove	89	40	59.8	1.98	
Gardiner	74	32	56.6	1.45	
Glendale	88	39	59.4	0.75	
Glenora	80	38	58.4	2.65	
Gold Beach	72	40	55.8	0.59	
Government Camp	69	33	47.4	3.74	
Granite	.....	.....	.....	0.90	
Grants Pass	93	37	61.8	0.32	
Grass Valley	88	35	55.9	1.30	
Heisler	88	39	61.2	.....	
Heppner	92	41	62.4	2.15	
Hood River	82	46	64.2	1.22	
Huntington	90	41	64.4	0.75	
Jacksonville	90	41	63.0	1.29	
John Day	92	40	61.0	0.53	
Joseph	75	35	54.3	2.88	
Kerby	93	36	61.4	0.13	
Klamath Falls	90	31	58.6	0.28	
Lagrande	81	35	58.4	2.83	
Lakeview	90	30	57.7	0.70	
Lonerock	85	35	56.6	1.06	
McKenzie Bridge	84	35	59.6	2.32	
McMinnville	83	39	60.0	0.94	
Marshfield	72	42	57.6	1.26	
Mill City	79	37	57.6	2.03	
Monroe	82	41	59.4	1.20	
Mount Angel	84	47	60.9	1.37	
Nehalem	.....	.....	.....	2.91	
Newport	63	45	54.8	2.71	
Odell	.....	.....	.....	0.34	
Ontario	.....	.....	.....	1.64	
Paisley	83	35	58.0	.....	
Pendleton	91	40	64.4	1.73	
Port Oxford	64	48	54.8	1.95	
Pine	85	30	56.8	0.76	
Prineville	85	34	57.2	0.90	
Riverside	93	32	66.8	1.47	
Salem	80	45	60.8	0.59	
Silverlake	84[c]	23[d]	54.1[d]	2.33	
Sparta	80	34	55.8	0.53	
Stafford	82	40	59.4	1.51	
The Dalles	88	47	66.4	1.27	
Toledo	71	41	56.2	2.10	
Umatilla	96	48	70.1	0.70	
Vale	89	37	61.8	1.69	
Van	.....	.....	.....	1.29	
Wallowa	83	30	57.2	2.22	
Wamic	85	33	57.8	1.75	
Warm Spring	91	41	62.7	0.77	
Weston	86	35	58.8	3.60	
Williams	90	34	59.8	0.90	
Pennsylvania.					
Aleppo	91	36	68.3	3.60	
Altoona	92	40	66.4	5.16	
Beaver Dam	.....	.....	.....	7.17	
Bellefonte	97	42	68.9	3.63	
Brookville	.....	.....	.....	6.14	
Browers	.....	.....	.....	3.29	
California	94	41	70.2	7.75	
Cassandra	89	38	65.0	7.58	
Centerhall	92	40	66.2	4.63	
Clarion	.....	.....	.....	5.46	
Claysville	93	36	69.2	8.12	
Clearfield	..	.....	.....	6.02	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Coatsville	96	43	70.0	3.57	
Confluence				6.64	
Coudersport	88	35	63.4	5.66	
Davis Island Dam				6.06	
Derry	93	37	70.3	7.93	
Doylestown				2.81	
Dushore	90	35	63.6	4.46	
East Mauch Chunk	97	40	68.5	2.30	
Easton	96	45	69.2	2.34	
Ellwood Junction				5.48	
Emporium	90	39	66.7	4.33	
Ephrata	96	43	69.2	2.59	
Everett	91	41	67.7	6.62	
Forks of Neshaminy				2.59	
Franklin	90	38	67.0	4.21	
Freeport	96	39	70.1	5.77	
Gettysburg	97	44	70.8	5.77	
Girardville				2.47	
Gordon	93	34	66.4	2.70	
Grampian	90	34	63.6	3.27	
Greensboro				6.04	
Greenville	92	37	67.0	5.63	
Hamburg	95	42	70.0	3.48	
Hanover	99	43	71.0	5.15	
Herrs Island Dam				7.09	
Huntingdon	90	38	68.4	4.09	
Indiana	90	38	67.3	4.46	
Irwin	96	38	70.3	6.05	
Johnstown	95	44	71.2	6.78	
Kennett Square	92	45	69.0	3.27	
Lansdale				2.19	
Lawrenceville	92	38	66.4	5.12	
Lebanon	95	41	69.4	3.53	
Leroy	87	43	64.9	4.19	
Lewisburg	92	39	68.4	4.93	
Lockhaven	96	41	69.0	7.02	
Lock No. 4				7.60	
Lycippus	89	42	69.1	7.22	
Marion	93	43	69.7	4.56	
Mifflintown	94	40	69.2	2.90	
Milford	94	37	66.4	2.61	
New Germantown	92	41	68.3	3.96	
Ottsville				2.19	
Parker				5.02	
Philadelphia	95	51	71.2	1.79	
Pocono Lake	88	30	62.4	2.55	
Point Pleasant				2.64	
Pottsville				2.66	
Reading	95	43	69.9	2.02	
Saegerstown	90	37	65.8	4.71	
St. Marys	88	36	64.4	4.33	
Saltsburg				4.75	
Seisholtzville				2.07	
Selinsgrove	97	40	68.6	3.00	
Shawmont				1.94	
Skidmore	92	33	67.6	4.47	
Smiths Corners				2.64	
Somerset	88	33	65.1	8.35	
South Eaton	89	40	66.6	2.35	
Springdale				7.28	
Springmount				2.59	
State College	89	43	66.5	3.98	
Swarthmore	94[1]	45[b]	70.0[1]	1.33	
Towanda	89	38	66.1	4.72	
Uniontown	94	42	70.6	5.26	
Warren	98	37	67.1	6.25	
Wellsboro	92	38	65.4		
Westchester	93	49	70.0	2.65	
West Newton				7.66	
Wilkesbarre	92	43	68.8	2.54	
Williamsport	91	44	68.8	3.13	
Rhode Island.					
Bristol	78	44	62.4	5.46	
Kingston	85	38	62.8	5.22	
Narragansett	81	39	61.8	5.04	
Pawtucket				5.63	
Providence *a*	92	46	68.6	6.22	
South Carolina.					
Allendale	98	60	80.8	3.28	
Anderson	97	53	78.7	3.26	
Barksdale	95	55	79.0	2.24	
Batesburg	98	56	80.2	0.47	
Beaufort	96	62	80.0	2.32	
Blackville	99	54	81.0	2.41	
Bowman	98	54	79.3	2.33	
Calhoun Falls				0.66	
Camden				0.48	
Cheraw	98	55	77.6	1.18	
Clarks Hill	96	55	79.2	2.55	
Clemson College	93	53	77.5	1.07	
Conway	95	54	77.2	3.65	
Darlington	100	50	77.0	1.62	
Dillon	100	51	78.6	3.49	
Due West	96	57	78.6	3.51	
Edisto				1.75	
Effingham				2.30	
Enoree				1.85	
Florence	100	51	78.9	4.66	
Gaffney	100	54	80.6	0.59	
Georgetown	94	60	77.8	2.11	
Greenwood	96	57	79.0	3.07	
Heath Springs	99	50	79.0	0.40	
Kingstree	96	61	79.9	2.09	
Liberty	96	50	79.0	2.55	
Little Mountain	99	56	80.2	0.17	
Newberry	100	53	80.6	0.35	
Pelzer				0.75	
Pinopolis *[1]	92	59	75.6	1.19	
St. George	98	57	78.9	0.20	
St. Matthews	95	58	77.5	1.38	
St. Stephens				4.11	
Saluda	99	50	79.6	1.27	
Santuck	98	54	79.2	0.63	
Seivern	100	43	78.0	3.08	
Smiths Mills				1.83	
Society Hill	98	56	79.4	0.58	
Statesburg	98	58	79.8	0.81	
Summerville	97	58	77.4	2.12	
Trenton	97	56	79.0	1.51	
Trial	97	52	78.2	3.06	
Walhalla	95	51	76.6	6.30	
Walterboro	100	56	79.2	1.71	
Winnsboro	99	57	79.4	0.49	
Winthrop College	97	53	78.0	0.92	
Yemassee	98	59	78.6	3.20	
Yorkville	101	56	80.3	1.56	
South Dakota.					
Aberdeen	95	39	63.0	7.40	
Academy	96	45	66.1	7.38	
Alexandria	100	38	66.2	7.60	
Armour	103	42	67.8	8.10	
Ashcroft	100	39	61.0	2.58	
Bowdle	91	40	61.0	3.67	
Brookings	92	33	63.8	6.09	
Canton	93	34	66.6	8.57	
Centerville	92	36	66.6	5.13	
Chamberlain	98	46	66.4	5.36	
Cheyenne	94	38	64.2	7.70	
Clark	92	36	63.2	4.65	
Clear Lake	90	38	63.7	6.65	
Doland	93	37	65.0	6.85	
Elkpoint	96	38	69.8	3.09	
Fairfax	92	42	67.0	6.28	
Farmingdale				4.24	
Faulkton	92	39	61.9	4.50	
Flandreau	93	37	64.6	8.96	
Forestburg	96	36	65.4	10.91	
Fort Meade	92	38	59.9	4.84	
Gannvalley	97	40	65.0	5.66	
Grand River School	94	38	63.6	4.91	
Greenwood	94	47	68.4	5.10	
Highmore	90	40	62.4	5.64	
Hitchcock				5.69	
Hotch City	95	42	63.6	5.16	
Howard	93°	37°	64.5°	7.77	
Howell	95	37	63.7	5.68	
Ipswich	94	35	62.7	6.58	
Kidder	90	44	62.2	2.90	
Kimball	98	42	65.4	6.99	
Leola	91	40	61.2	3.22	
Leslie	97	40	65.2	5.20	
Marion	93	38	66.4	7.66	
Mellette	95	34	63.0	3.46	
Menno	94	39	66.6	5.97	
Mil'bank	95	37	63.1	8.60	
Mitchell	98	39	65.6	7.57	
Oelrichs	92	42	62.2	3.61	
On-the-Trees Camp	93	40	63.4	2.56	
Pine Ridge	89°	41°	63.0°	2.63	
Plankinton	96	42	65.0	7.50	
Ramsey	94	35	64.4	7.49	
Redfield	93	36	62.6	5.52	
Rousseau				3.81	
Sioux Falls	94	39	67.2	6.89	
Sisseton Agency	90	36	61.3	3.88	
Spearfish	89	38	59.2	5.85	
Stephan	89	40	63.6	5.50	
Vermillion	94	40	70.0	4.28	
Watertown	91	36	61.8	5.46	
Wentworth	94	37	65.4	6.96	
Wolsey				7.81	
Tennessee.					
Andersonville	93	50	75.5	7.20	
Arlington	98	56	78.3	6.09	
Ashwood	95	50	75.8	5.24	
Benton	93	48	75.6	5.73	
Bluff City				2.61	
Bolivar	94	55	77.0	7.48	
Brownsville	95	57	78.9	5.78	
Byrdstown	92	50	74.4	6.50	
Carthage	96	50	76.7	10.20	
Catlettsburg				3.70	
Cedar Hill	98	52	77.2	6.90	
Celina				5.40	
Charleston				7.78	
Clarksville	95	56	76.3	4.19	
Clinton				3.64	
Covington	95	57	78.2	4.27	
Dandridge				3.46	
Decatur	94	50	75.0	9.73	
Dickson	96	49	75.5	5.60	
Dover	99	51	77.5	6.02	
Dyersburg	96	58	78.0	6.21	
Elizabethton	92	49	72.6	2.42	
Erasmus	90	40	70.0	5.02	
Florence	91	53	75.7	6.75	
Franklin	92	53	75.6	8.37	
Goodrich	95	48	75.5	3.62	
Grace				10.80	
Greeneville	90	48	73.0	4.71	
Halls Hill				8.98	
Harriman	92	52	75.0	3.42	
Hohenwald	95	44	72.8	9.47	
Iron City	92	50	75.3	10.33	
Isabella	93	50	75.5	5.45	
Jackson	96	51	77.8	12.09	
Johnsonville	98	53	77.0	6.37	
Jonesboro	94	44	72.7	5.02	
Kenton	94	53	75.9	4.28	
Kingston				4.89	
Lafayette	99	45	75.0	4.40	
Leadvale				4.20	
Lewisburg	96	52	78.0	8.57	
Loudon				5.35	
Lynnville	92	46	76.2	8.18	
McGee				2.40	
McMinnville	95	48	74.6	9.61	
Maryville	96	50	75.8	2.55	
Milan	95	51	77.4	5.99	
Newport	92	51	75.2	2.72	
Palmetto	95[1]	53	76.8°	5.95	
Pope	100	49	77.0	8.75	
Rogersville	94	47	74.0	3.00	
Rugby	97	45	72.8	7.01	
Savannah	95	53	77.0	5.56	
Sewanee	87	53	72.6	10.94	
Silver Lake	85	43	68.2	3.60	
Springdale	96	48	74.2	2.76	
Springville	97	50	76.6	2.19	
Tazewell				2.62	
Tellico Plains	93	48	75.0	7.74	
Tracy City	89	41	71.2	9.41	
Trenton	96	54	78.3	5.94	
Tullahoma	95	51	75.2	6.95	
Union City	98	51	77.4	4.63	
Walling				8.93	
Waynesboro	94	50	76.0	11.84	
Wildersville	90	55	75.4	5.93	
Yukon	92	56	76.4	7.68	
Texas.					
Albany	102	63	80.4	1.11	
Alvin				7.23	
Arthur				7.37	
Athens	100	69	83.2	2.50	
Austin	94	68	81.6	5.18	
Ballinger	101	64	81.0	2.68	
Beaumont				11.96	
Beeville	96	67	81.0	6.58	
Bigspring	107	59	79.6	3.52	
Blanco	95	62	79.0	1.79	
Boerne	95	61	78.3	4.10	
Bonham	99	64	82.0	1.56	
Booth				6.95	
Bowie	97	64	80.8	2.82	
Brazoria	102	67	82.9	5.40	
Brenham	96	69	81.0	6.55	
Brighton	90[d]	69[d]	81.7[d]	2.60	
Brownwood	99	62	80.4	2.41	
Channing	102	54	73.7	1.35	
Childress	97	60	79.0	2.65	
Clarksville	98	63	80.9	3.88	
Claude	95	55	74.6	1.49	
Claytonville	100	60	78.4	2.06	
Coleman	90°	64°	77.4°	0.30	
College Station	98	68	81.4	15.03	
Colorado	106	58	79.8	2.46	
Columbia	94	69	81.2	12.98	
Columbus				5.20	
Comanche	104	62	81.4	1.86	
Comstock	98°	63°	79.6°	5.61	
Corsicana	100	64	83.2	4.55	
Cotulla	104	68	83.1	2.48	
Crockett	94	66	79.1	11.01	
Cuero	98	64	82.7	7.26	
Dallas	98	65	80.8	4.03	
Danevang	98	67	82.3	8.71	
Decatur	97	64	79.0	4.25	
Dialville	94	68	79.8	7.54	
Dublin	101	53	82.5	1.21	
Duval	94	67	80.7	5.41	
Eagle Pass	101	65	82.8	2.67	
Fort Brown	97	68	83.2	2.30	
Fort Clark	99	67	80.7	2.00	
Fort Davis	93	52	73.0	3.55	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort McIntosh	103	69	84.5	1.82	
Fort Ringgold	102	60	83.2	2.07	
Fort Stockton	100	58	77.0	4.62	
Fredericksburg	96	63	79.0	1.05	
Gainesville	95	64	79.0	5.76	
Gatesville	97	64	81.5	2.95	
Georgetown	96	63	80.6	3.74	
Gonzales				3.29	
Graham	99	62	80.2	6.33	
Grapevine	99[d]	66[d]	81.5[d]	2.24	
Greenville	102	65	82.0	3.55	
Hale Center	96	58	75.4	3.14	
Hallettsville	97	68	82.4	1.75	
Haskell	102	60	79.6	4.23	
Hearne	96	64	81.2	8.42	
Hempstead				6.08	
Henrietta	99	62	80.4	2.80	
Hewitt				5.58	
Hillsboro	97	62	81.0	3.96	
Hondo	97	67	81.9	5.02	
Houston	97	69	82.8	7.92	
Hubbard	96	68	80.9	4.04	
Huntsville	99	68	82.5	5.58	
Jefferson	93	66	79.8	15.33	
Jewett	95	66	79.0	8.11	
Junction				1.64	
Kaufman	99	67	82.9	3.02	
Kent	100	52	75.8	0.46	
Kerrville	92	61	78.0	5.30	
Knickerbocker	101	58	79.7	2.14	
Kopperl				3.83	
Lampasas	96	62	79.4	4.75	
Liberty	96	75	85.8	6.85	
Lone Star Ranch				2.10	
Longlake				6.47	
Longview	100	68	82.6	8.51	
Luling	96	70	82.0	4.87	
McKinney	99	63	80.6	4.71	
Marlin	99	66	81.7	6.69	
Menardville	101	55	79.0	0.44	
Mexia	95	68	80.2	5.85	
Miami	103[f]	52	77.5[e]	4.76	
Mobeetie	96	59	76.2	2.14	
Mount Blanco	98	57	76.0	3.93	
Mount Pleasant	98	65	80.8	7.42	
Nacogdoches	95	66	80.0	5.21	
New Braunfels	94	68	80.4	4.39	
Orange				4.60	
Panter				4.32	
Paris	96	69	81.6	2.27	
Pearsall	100	69	83.0	0.81	
Pierce	96	68	81.0	6.93	
Port Lavaca	94	67	81.2	3.92	
Quanah	99	59	80.9	2.25	
Rhineland	100	56	79.0	3.50	
Riverside				3.67	
Rockisland	94	66	80.0	5.67	
Rockland				3.04	
Rockport	90	72	81.0	12.52	
Runge	98	62	82.7	3.73	
Sabinal	100	65	81.5	5.42	
San Marcos	95	66	80.8	5.49	
San Saba	97	60	84.6	3.18	
Santa Gertrude				1.42	
Seymour	98	64	79.5	4.51	
Sherman	98	64	81.1	1.55	
Sugarland	96	78	88.2	5.45	
Sulphur Springs	95	65	80.2	3.52	
Temple	95	66	80.1	9.32	
Texline	100	45	70.0	0.93	
Tilden	103	64	83.4	5.82	
Trinity	99	67	81.6	5.61	
Tulia	94	57	74.1	0.11	
Tyler	99	67	82.6	7.48	
Valley Junction				5.95	
Victoria	95	68	81.4	3.77	
Waco	102	71	84.8	5.40	
Waxahachie	100	64	81.5	5.51	
Weatherford	99	65	81.4	2.76	
Wharton	96	60	79.6	3.08	
Wichita Falls				3.61	
Willspoint	97	66	80.5	5.65	
Utah.					
Alta				0.88	2.0
Aneth	97	44	72.0	T.	
Beaver	84	23	56.2	0.00	
Blackrock	91	37	64.5	T.	
Blacksmith Forks				1.34	
Castledale	90	30	61.2	0.00	
Castle Rock				0.24	
Cisco	97	46	71.1	0.00	
Corinne	96	40	66.6	0.10	
Coyoto	85	25	56.7	0.00	
Deseret	94	34	65.2	0.00	
Emery	76	33	57.4	0.00	
Escalante	90	40	65.6	T.	
Experiment Farm	100	43	73.8		
Farmington	93	40	65.5	0.33	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fillmore	97	39	69.6	T.	
Fort Duchesne	97	32	64.8	0.10	
Frisco	95	39	68.6	0.02	
Garrison	90	32	65.4	T.	
Giles	104	39	71.0	0.05	
Government Creek	89	34	64.2	T.	
Grayson	110	40	68.2	0.30	
Heber	87	32	60.2	0.43	
Henefer	87	30	58.3	0.22	
Hite	103	51	78.0	T.	
Huntsville				0.55	
Ibapah	90	30	59.0	0.40	
Indianola				T.	
Kanab	91	30	61.2	0.00	
Kelton	91	36	63.8	T.	
La Sal	83	40	60.2	0.04	
Levan	90	36	64.6	0.30	
Loa	87	28	61.1	0.00	
Logan	89	39	65.2	0.63	
Lucin	90	37	63.8	0.10	
Manti	88	37	63.4	0.05	
Marion				0.58	
Marysvale	88	31	60.4	T.	
Meadowville	81	32	56.8	1.15	
Millville				0.76	
Minersville	94	50	74.0	T.	
Moab	99	41	73.0	0.00	
Morgan	86	33	58.8	0.51	
Mount Nebo	90	39	66.8	0.34	
Mount Pleasant	89	37	65.5	0.00	
Nephi				0.26	
Oak City	94	35	68.8	0.00	
Ogden	89	44	67.9	0.85	
Park City	78[d]	31[d]	55.6[d]	0.39	
Parowan	93	31	64.3	T.	
Payson				T.	
Pinto	86	27	58.5	0.00	
Plateau	85	28	58.3	T.	
Provo				0.33	
Ranch	84	28	55.0	0.00	
Randolph				0.78	
Rockville	101	44	75.8	0.00	
St. George	104	48	75.6	0.00	
Salt Air	94	49	71.6	0.16	
Scipio	91	32	63.4	0.09	
Snowville	89	32	60.0	0.59	
Soldier Summit	90	25	54.2	0.00	
Strawberry Valley				0.17	
Sunnyside				0.13	
Thistle	104	27	64.8	0.00	
Tooele	88	37	63.0	T.	
Tropic	86	33	59.4	T.	
Trout Creek	96	35	64.8	0.00	
Utah Lake	94	37	64.7	0.11	
Vernal	93	44	68.0	0.21	
Wellington	93	36	63.6	0.00	
Woodruff	80	29	55.0	0.40	
Vermont.					
Burlington	86	44	63.8	4.70	
Cavendish	90	36	61.6	5.04	
Chelsea	86	33	59.6	3.40	T.
Chittenden				6.30	
Cornwall	88	40	64.8	6.05	
Enosburg Falls	87	31	62.0	4.10	
Jacksonville	87	33	59.0	3.30	
Manchester	83	36	60.2	5.24	
Norwich	88	35	62.0	4.57	
St. Johnsbury	89	36	63.0	3.36	
Wells	85	38	61.9	6.77	
Westfield				3.56	
Woodstock	86	33	58.0	4.82	
Virginia.					
Arvonia	101	42	72.8	2.39	
Ashland	95	48	73.7	4.93	
Barboursville	91	47	72.8	4.92	
Bigstone Gap	91	46	71.8	5.23	
Blacksburg	89	33	66.5	2.57	
Buchanan				4.85	
Burkes Garden	86	34	64.6	2.00	
Callaville	97	45	75.1	1.52	
Cape Henry	96	52	73.1	2.05	
Charlottesville	94	52	73.0	8.00	
Clarksville				3.05	
Columbia	93	49	72.5	5.41	
Dale Enterprise	96	41	70.2	6.35	
Danville				1.03	
Dinwiddie	96	41	73.0	2.49	
Elk Knob	87	52	71.6	5.40	
Farmville	95	49	75.4		
Fredericksburg	94	47	72.2	4.74	
Grahams Forge	87	40	68.8	2.29	
Greenwich	93	51	72.2	2.69	
Hampton	93	52	75.0	2.69	
Hot Springs	86	39	67.4	4.68	
Ivanhoe				2.83	
Lexington	96	42	73.4	6.29	
Lincoln	96	41	71.4	6.95	
Marion	90	44	69.6	2.33	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mendota				4.70	
Newport News	93	54	75.0	3.09	
Petersburg		51		2.50	
Quantico	94	41	73.6		
Radford				2.06	
Randolph				1.65	
Riverton				7.05	
Roanoke				2.75	
Rockymount	95	48	74.2	3.46	
Saxe	97	44	74.6	2.00	
Shenandoah				2.85	
Speers Ferry				3.82	
Spottsville	96	46	73.8	5.72	
Stanardsville	93	45	71.2	4.10	
Staunton	91	50	71.8	3.69	
Stephens City	98	43	71.0	7.08	
Warsaw	94	45	74.2	6.48	
Williamsburg	94	46	71.4	3.12	
Woodstock	98	42	72.0	6.74	
Washington.					
Aberdeen	75	42	57.0	4.41	
Anacortes	72[e]	45[e]	58.2[e]	1.52	
Ashford				5.38	
Bellingham	75	41	58.8	1.56	
Blaine	75	40	58.6	3.57	
Bremerton	78	45	57.2	1.85	
Brinnon	78	46	59.4	2.40	
Cedonia	78	37	57.2	1.72	
Centralia	83	40[h]	60.2[d]	2.62	
Cheney	84	27	62.5	3.36	
Clearbrook	80	24	58.7	1.66	
Clearwater	69	38	56.8	3.10	
Cle Elum	82	35	57.4	3.27	
Colfax	81	35	58.2	3.48	
Colville	85	33	59.4	1.84	
Conconully	81	39	58.8	3.47	
Coupeville	76	45	58.1	1.91	
Crescent	83	38	56.6	3.01	
Cusick	83	37	58.0	2.34	
Danville	84	39	60.4	1.21	
Dayton	83	42	62.2	4.41	
Easton				3.31	
East Sound	80	38	57.6	2.45	
Ellensburg	86	40	61.3	4.54	
Ephrata	88	44	66.1	3.41	
Fort Simcoe				1.82	
Granite Falls				3.94	
Hatton	101	38	67.1	1.69	
Horse Heaven				1.18	
Ilwaco	68	47	56.8	4.54	
Kiona	93	48	67.6	1.77	
Lacenter	84	42	59.2	2.00	
Lakeside	87	46	64.9	4.59	
Lester	79	36	56.6	3.99	
Loomis	85	47	64.2	2.93	
Merritt				2.74	
Mottinger Ranch	100	47	69.4	1.18	
Mount Pleasant	80	46	59.2	2.62	
Moxee	88	39	63.2	3.65	
Northport	83	31	58.5	2.55	
Odessa	90	39	62.6	2.58	
Olga	68	45	56.6	1.56	
Olympia	87	38	61.4	3.18	
Pinehill	89	44	63.0	1.23	
Pomeroy	85	37	60.4	2.16	
Port Townsend	71	46	57.1	2.02	
Pullman				3.46	
Republic	80	35	57.3	2.04	
Ritzville				2.13	
Ritzville (near)				1.99	
Rosalia	79	31	57.4	3.70	
Silvana	78	40	58.4	2.39	
Snohomish	81	40	59.2	2.29	
Snoqualmie	86	41	61.2	3.48	
Southbend	78	42	57.8	3.36	
South Ellensburg	86	46	62.2	4.25	
Sprague				3.00	
Sunnyside	90	44	64.4	1.12	
Tekoa				2.56	
Touchet	94	40	68.0	0.99	
Trinidad	91	50	68.3	3.53	
Twisp	87	39	60.4	3.05	
Union	83	40	59.8	2.11	
Vancouver	84	44	61.8	2.40	
Vashon	78	45	59.5	3.27	
Wahluke	93	40	65.8	2.38	
Waterville	85	42	60.2	3.85	
Wenatchee (near)	88	40	62.5	5.18	
Wilbur	80	35	58.0	3.66	
Zindel	92	45	66.0	1.59	
West Virginia.					
Bancroft	95	50	73.6	3.48	
Bayard	87	34	65.5	3.42	
Bens Run	94	45	72.6	2.92	
Berkley Springs	94	41	71.0	4.10	
Bluefield	91	42	70.4	3.20	
Buckhannon	93	40	69.7	3.63	
Burlington	93	41	69.0	4.68	

TABLE II.—*Climatological record of cooperative observers. Late reports for May*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cairo	93	40	69.5	2.26	
Central	93	40	69.8	2.86	
Charleston	93	50	74.7	5.05	
Creston	95	43	71.8	3.74	
Cuba	91	44	70.6	4.99	
Elkhorn	93	46	70.8	4.37	
Fairmont	94	40	70.4	4.10	
Glenville	97	44	72.8	1.97	
Grafton	91	40	70.0	5.05	
Green Sulphur Springs	94	41	68.7	2.78	
Harpers Ferry	.....	.....	.....	6.05	
Highland Springs	88	43	68.2	5.13	
Hinton	.....	.....	.....	2.92	
Huntington	95	49	74.3	5.26	
Leonard	95	43	72.8	2.20	
Lewisburg	92	40	69.3	3.30	
Logan	94	48	72.6	4.94	
Lost Creek	92	38	67.4	3.41	
Madison	96	44	71.8	5.71	
Mannington	93	40	70.4	3.08	
Marlinton	87	35	66.2	7.57	
Martinsburg	97	45	70.6	6.05	
Moorefield	97	42	71.3	6.44	
Morgantown	90	42	69.7	3.94	
Moundsville	95	42	70.6	4.43	
New Cumberland	88	40	67.8	6.70	
New Martinsville	96	43	72.4	2.94	
Nuttallburg	92	40	68.8	1.55	
Parsons	91	40	66.4	4.27	
Philippi	93	40	70.2	6.12	
Pickens	89	40	67.6	4.76	
Point Pleasant	97	50	73.4	4.46	
Princeton	84	49	69.4	4.00	
Rowlesburg	.....	.....	.....	6.32	
Ryan	94	42	71.3	5.34	
Smithfield	95	43	71.6	7.45	
Southside	95	44	74.3	2.36	
Sutton	96	44	74.5	4.28	
Terra Alta	89	38	67.0	7.72	
Uppertract	94	40	69.0	6.30	
Valley Fork	100	40	71.7	4.47	
Weston	97	41	72.4	2.13	
Wheeling	102	50	75.0	5.86	
Williamson	95	50	73.8	3.95	
Wisconsin.					
Amherst	88	36	64.3	9.70	
Antigo	88	40	64.2	2.37	
Appleton	85	41	64.2	6.38	
Appleton Marsh	87	34	63.0	6.08	
Ashland	.....	.....	.....	8.10	
Barron	86	38	62.5	13.70	
Berlin	90	40	64.9	10.12	
Black River Falls	.....	.....	.....	4.48	
Burnett	85	37	64.2	7.49	
Butternut	85	32	61.3	10.38	
Chilton	87	37	64.0	8.36	
Chippewa Falls	.....	.....	.....	8.03	
Citypoint	88	45	66.4	7.46	
Cranberry Ex. Sta	90	27	61.8	6.76	
Darlington	96	35	66.1	4.02	
Dodgeville [4]	91	41	68.8	.....	
Downing	90	40	62.2	7.05	
Eau Claire	86	45	66.4	6.59	
Florence	85	35	60.8	7.22	
Fond du Lac	89	35	65.7	7.19	
Grand Rapids	85	39	64.6	8.05	
Grand River Locks	.....	.....	.....	9.53	
Grantsburg	86	37	62.6	9.81	
Hancock	88	39	63.2	10.55	
Harvey	89	40	65.9	5.66	
Hayward	84	34	60.6	6.66	
Hillsboro	88	37	64.9	5.43	
Koepenick	87	33	62.8	8.00	
Lancaster	89	42	67.6	4.09	
Manitowoc	88	39	59.9	5.43	
Mauston	90	39	65.3	7.60	
Meadow Valley	88	38	64.0	7.20	
Medford	89	38	64.4	16.20	
Menasha	.....	.....	.....	6.70	
Minocqua	89	41	62.2	7.13	
Mount Horeb	92	38	67.2	5.72	
Neillsville	90	38	65.6	8.83	
New London	90	39	65.2	5.86	
New Richmond	89	41	64.7	8.13	
Oconto	86	39	63.6	5.58	
Osceola	85	40	62.8	6.27	
Oshkosh	98	41	67.0	9.84	
Pine River	88	38	63.6	9.28	
Portage	85	42	66.6	7.93	
Port Washington	88	36	58.2	4.38	
Prairie du Chien	98	46	69.6	5.73	
Prentice	86	32	62.6	9.23	
Racine	95	41	64.0	3.74	
Sheboygan	90	41	61.2	7.54	
Spooner	90[f]	55[f]	63.6[f]	5.99	
Stanley	84	38	62.8	9.00	
Stevens Point	87	38	63.4	9.55	
Sturgeon Bay Canal	84	36	57.8	4.36	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Tomahawk	.....	.....	.....	6.82	
Valley Junction	89	36	66.2	6.52	
Viroqua	86	43	65.9	4.44	
Watertown	89	38	66.0	5.66	
Waukesha	87	44	64.9	5.69	
Waupaca	89[d]	40[d]	64.6[d]	7.33	
Wausau	86	41	62.6	5.68	
Whitehall	87	41	64.8	4.11	
Wyoming.					
Afton	80	29	53.9	1.05	
Alcova	90	39	63.4	0.65	
Basin	94	40	65.0	1.89	
Bedford	79	28	51.8	1.53	
Border	81	21	54.4	0.95	
Buffalo	87	34	56.8	3.80	T.
Cambria	89	34	60.8	5.21	
Chugwater	84	38	61.6	2.01	
Clark	.....	.....	.....	2.53	
Daniel	75	28	48.9	1.87	
Dubois	.....	.....	.....	2.14	
Eatons Ranch	82	34	57.9	4.49	
Elk Mountain	.....	.....	.....	0.86	
Embar	89	30	57.4	3.09	
Evanston	79	29	54.6	0.32	
Experiment Farm	.....	.....	.....	0.31	
Fayette	83	27	55.4	.....	
Fort Laramie	97	43	64.4	2.32	
Fort Washakie	86	30[e]	55.9[b]	1.02	
Gillette	88	38	61.2	3.52	
Granite Canyon	84	35	57.2	0.48	
Granite Springs	.....	.....	.....	1.13	
Green River	95	34	60.8	0.15	
Hatton	.....	.....	.....	0.27	
Hyattville	96	37	63.0	.....	
Iron Mountain	87	38	61.5	2.22	
Jackson	79	27	51.8	1.20	
Kaycee	89	35	58.2	1.87	
Kirtley	84	39	59.5	2.12	
Laramie	83	34	58.4	0.36	
Leo	83	31	57.1	0.28	
Little Medicine	78	26	54.1	0.31	
Lolabama Ranch	76	29	48.8	2.52	2.0
Lusk	87	35	59.1	2.82	
Marquette	85	34	55.2	2.04	
Meeteetse	93	32	56.1	2.08	
Moore	87	37	61.4	1.67	
Moorcroft	89	38	60.0	2.06	
Phillips	87	41	62.0	2.37	
Pine Bluff	91	43	64.0	2.73	
Rambler	70[i]	28[i]	49.4[i]	0.92	5.0
Rock Springs	86	34	59.4	.....	
Sheridan	88	36	58.4	3.68	
South Pass City	79	28	53.6	0.81	T.
Thayne	81	28	52.8	1.59	
Torrington	93	42	65.0	4.12	
Wells	76	27	49.3	1.47	
Yellowstone Pk. (C. H.)	70	27	46.0	2.78	
Yellowstone Pk. (Foun'n)	71[f]	27[e]	46.6[e]	2.54	T.
Yellowstone Pk. (Lake)	70	26	44.8	3.34	7.0
Yellowstone Pk. (Soda B.)	78	25	51.6	3.63	.....
Yellowstone Pk. (U. Ba'n)	81	27	49.8	3.02	.....
Porto Rico.					
Adjuntas	88	55	72.2	1.65	
Agua Buenas	.....	.....	.....	4.73	
Aguirre	88	65	80.6	7.99	
Aibonito	88	56	74.6	5.24	
Arecibo	90	67	78.3	3.02	
Barros	92	62	76.4	3.25	
Bayamon	92	64	78.8	2.65	
Caguas	91	65	78.1	4.05	
Canovanas	95	73	81.4	2.51	
Cidra	87	55	72.0	.....	
Carozal	90	63	77.2	3.04	
Fajardo	91	74	82.0	3.43	
Guanica	92	64	78.7	2.90	
Hacienda Coloso	93	67	79.2	8.25	
Hacienda Josefa	.....	.....	.....	5.58	
Humacao	90	74	83.0	5.40	
Ingenio	.....	.....	.....	7.47	
Isabela	91	67	79.2	2.73	
Juana Diaz	93	70	80.7	4.25	
La Carmelita	87	61	74.2	8.48	
La Ysolina	92	63	77.4	8.38	
Lares	92	60	77.2	9.40	
Las Cruces	85	63	71.6	5.57	
Las Marias	90	64	77.2	12.43	
Manati	99	66	81.1	3.01	
Maunabo	94	70	81.8	8.63	
Mayaguez	92	65	79.8	5.82	
Rio Piedras	.....	.....	.....	2.42	
San German	96	65	79.3	2.90	
San Lorenzo	94	64	79.7	7.11	
San Salvador	88	62	74.9	5.92	
Santa Isabel	91	68	79.4	3.74	
Vieques	95	71	82.2	1.45	
Yauco	91	70	80.5	2.61	
New Brunswick.					
St. John	78	39	53.2	3.68	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Indies.	°	°	°	*Ins.*	*Ins.*
Basseterre, St. Kitts	87	71	79.9	.....	

Late reports for May, 1905.

Alaska.	°	°	°	*Ins.*	*Ins.*
Chestochena	68	20	42.6	0.48	
Copper Center	69	20	44.3	0.48	
Fort Egbert	75	25	47.4	0.33	
Fort Gibbon	81	12	48.1	0.84	1.0
Fort Liscum	57	31	42.5	7.02	
Kenai	63	22	44.2	0.84	T.
Ketchumstock	67	27	43.4	0.20	
Loring	93	29	50.9	9.46	
Nushagak	61	0	41.2	2.51	
Petersburg	72	28	50.0	3.03	
Sunrise	63	27	43.6	0.84	
Tanana	.....	20	.....	0.14	
Teikhill	68	20	43.2	T.	
Udakta	55	30	42.8	.....	
Wood Island	65	30	47.3	2.70	
California.					
Laytonville	.....	.....	.....	2.00	
San Miguel Island	.....	.....	.....	0.80	
Sausalito	.....	.....	.....	3.69	
Wasioja	.....	.....	.....	2.52	
Willets	.....	.....	.....	2.09	
Yreka	.....	.....	.....	0.93	
Connecticut.					
Farmington	86	21	54.9	0.71	
Massachusetts.					
Amherst	82	32	57.2	1.28	T.
Michigan.					
Coldwater	84	27	58.6	7.51	
Mississippi.					
Shoccoe	98	51	75.8	3.77	
Swan Lake	95	57	74.7	8.76	
Montana.					
Jordan	83	19	49.4	.....	
New Hampshire.					
Franklin Falls	84	30	54.9	1.73	T.
Littleton	76	28	52.2	2.91	1.0
New Mexico.					
Fruitland	84	26	56.9	T.	
Gran Quivira	.....	.....	.....	0.15	
Magdalena	.....	.....	.....	0.00	
North Carolina.					
Washington	92	42	72.3	4.14	
Texas.					
Fort Ringgold	102	60[j]	85.4[b]	1.50	
Washington.					
Ritzville, (near)	.....	.....	.....	1.58	
West Virginia.					
Princeton	85	40	64.6	.....	
Wyoming.					
Kirtley	74	21	46.5	5.12	1.7
Porto Rico.					
Corozal	89	63	77.1	4.67	
Veja Baja	90	65	77.4	3.49	
Mexico.					
Vera Cruz	87	73	83.1	0.00	

EXPLANATION OF SIGNS.

• Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "s" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS, MARCH, 1905.

New Mexico, Albuquerque, make mean temperature 48.8 instead of 49.0.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of June, 1905.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	16	30	7	18	s. 38 w.	18
Portland, Me	16	22	18	18	s.	6
Concord, N. H.†	15	8	11	5	n. 41 e.	9
Northfield, Vt	23	30	3	10	s. 22 w.	18
Boston, Mass	14	17	15	29	s. 78 w.	14
Nantucket, Mass	13	26	11	30	s. 56 w.	23
Block Island, R. I	11	25	12	30	s. 52 w.	23
Providence, R. I	19	17	12	26	n. 82 w.	14
Hartford, Conn	15	29	9	17	s. 30 w.	16
New Haven, Conn	18	27	12	19	s. 38 w.	11
Middle Atlantic States.						
Albany, N. Y	15	31	9	14	s. 17 w.	17
Binghamton, N. Y.†	9	5	13	9	n. 45 e.	6
New York, N. Y	14	23	14	24	s. 48 w.	14
Harrisburg, Pa	17	20	16	21	s. 59 w.	6
Philadelphia, Pa	14	26	12	20	s. 34 w.	14
Scranton, Pa	18	25	6	30	s. 74 w.	25
Atlantic City, N. J	15	22	12	23	s. 58 w.	13
Cape May, N. J	14	33	13	11	s. 6 e.	19
Baltimore, Md	19	29	7	11	s. 35 w.	12
Washington, D. C	18	27	14	11	s. 21 e.	8
Lynchburg, Va	12	20	25	15	s. 51 e.	13
Mount Weather, Va	17	20	16	24	s. 69 w.	8
Norfolk, Va	9	25	19	12	s. 24 e.	18
Richmond, Va	15	24	17	17	s.	9
Wytheville, Va	17	10	14	31	n. 68 w.	18
South Atlantic States.						
Asheville, N. C	25	19	14	15	n. 9 w.	6
Charlotte, N. C	8	24	28	16	s. 37 e.	20
Hatteras, N. C	12	27	20	20	s.	15
Raleigh, N. C	15	28	13	14	s. 4 w.	13
Wilmington, N. C	11	23	22	15	s. 30 e.	14
Charleston, S. C	7	21	31	10	s. 56 e.	25
Columbia, S. C	10	21	23	19	s. 20 e.	12
Augusta, Ga	12	26	22	14	s. 30 e.	16
Savannah, Ga	10	21	20	21	s. 5 w.	11
Jacksonville, Fla	9	15	32	16	s. 69 e.	17
Florida Peninsula.						
Jupiter, Fla	12	11	24	24	n.	1
Key West, Fla	24	10	28	8	n. 55 e.	24
Tampa, Fla	25	10	24	19	n. 18 e.	16
Eastern Gulf States.						
Atlanta, Ga	11	20	19	23	s. 24 w.	10
Macon, Ga.†	9	13	7	7	s.	4
Pensacola, Fla.†	12	3	9	12	n. 18 w.	10
Birmingham, Ala.†	6	10	16	12	s. 27 w.	4
Mobile, Ala	17	23	5	22	s. 71 w.	18
Montgomery, Ala	9	26	15	21	s. 19 w.	18
Meridian, Miss.†	5	14	8	10	s. 13 w.	9
Vicksburg, Miss	14	29	16	19	s. 11 w.	15
New Orleans, La	8	34	18	18	s.	26
Western Gulf States.						
Shreveport, La	5	36	23	10	s. 23 e.	34
Fort Smith, Ark	10	20	34	7	s. 70 e.	29
Little Rock, Ark	14	30	14	15	s. 3 e.	16
Corpus Christi, Tex	4	40	29	2	s. 37 e.	45
Fort Worth, Tex	9	31	22	12	s. 24 e.	24
Galveston, Tex	3	43	16	6	s. 14 e.	41
Palestine, Tex	6	39	14	14	s.	33
San Antonio, Tex	8	25	41	1	s. 67 e.	44
Taylor, Tex.†	5	20	4	4	s.	15
Ohio Valley and Tennessee.						
Chattanooga, Tenn	19	24	11	21	s. 63 w.	11
Knoxville, Tenn	23	16	14	26	n. 60 w.	14
Memphis, Tenn	12	26	18	20	s. 8 w.	14
Nashville, Tenn	22	20	11	21	n. 79 w.	10
Lexington, Ky.†	4	13	9	9	s.	9
Louisville, Ky	20	22	16	15	s. 27 e.	2
Evansville, Ind.†	9	13	10	9	s. 14 e.	4
Indianapolis, Ind	22	18	21	13	n. 63 e.	9
Cincinnati, Ohio	21	17	22	18	n. 45 e.	6
Columbus, Ohio	21	18	21	17	n. 53 e.	5
Pittsburg, Pa	24	20	7	22	n. 75 w.	16
Parkersburg, W. Va	21	20	10	20	n. 84 w.	10
Elkins, W. Va	27	11	5	25	n. 51 w.	26
Lower Lake Region.						
Buffalo, N. Y	17	22	12	27	s. 72 w.	16
Oswego, N. Y	10	26	14	20	s. 21 w.	17
Rochester, N. Y	20	13	10	29	n. 70 w.	20
Syracuse, N. Y	13	23	11	26	s. 56 w.	18
Erie, Pa	11	24	13	24	s. 40 w.	17
Cleveland, Ohio	24	23	12	13	n. 45 w.	1
Sandusky, Ohio†	7	11	9	10	s. 14 w.	4
Toledo, Ohio	16	19	18	19	s. 18 w.	3
Detroit, Mich	21	14	18	18	n.	7
Upper Lake Region.						
Alpena, Mich	25	16	16	19	n. 18 w.	10
Escanaba, Mich	23	21	20	9	n. 80 e.	11
Grand Rapids, Mich	17	22	14	18	s. 39 w.	6
Houghton, Mich.†	3	3	15	10	e.	5
Marquette, Mich	22	19	13	22	n. 72 w.	10
Port Huron, Mich	25	19	19	13	n. 45 e.	8
Sault Ste. Marie, Mich	13	15	17	30	s. 81 w.	13
Chicago, Ill	18	23	24	9	s. 72 e.	16
Milwaukee, Wis	24	19	17	13	n. 39 e.	6
Green Bay, Wis	18	24	17	12	s. 40 e.	8
Duluth, Minn	32	7	24	16	n. 18 e.	26

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
North Dakota.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Moorhead, Minn	21	22	23	11	s. 85 e.	12
Bismarck, N. Dak	24	14	19	17	n. 11 w.	10
Devils Lake, N. Dak	22	15	20	16	n. 30 e.	8
Williston, N. Dak	22	15	23	14	n. 52 e.	11
Upper Mississippi Valley.						
Minneapolis, Minn.*	11	10	12	4	n. 83 e.	8
St. Paul, Minn	20	25	20	8	s. 67 e.	13
La Crosse, Wis.†	8	14	8	4	s. 34 e.	7
Madison, Wis	18	17	16	13	n. 72 e.	3
Charles City, Iowa	15	27	22	12	s. 40 e.	16
Davenport, Iowa	13	17	20	20	s.	4
Des Moines, Iowa	14	24	20	14	s. 31 e.	12
Dubuque, Iowa	17	26	19	11	s. 42 e.	12
Keokuk, Iowa	17	23	20	14	s. 45 e.	8
Cairo, Ill	19	23	21	13	s. 63 e.	9
La Salle, Ill.†	13	6	11	7	n. 30 e.	8
Peoria, Ill	10	13	8	4	s. 53 e.	5
Springfield, Ill	18	22	23	16	s. 60 e.	8
Hannibal, Mo.†	8	9	9	12	s. 72 w.	3
St. Louis, Mo	10	25	25	12	s. 41 e.	20
Missouri Valley.						
Columbia, Mo.*	9	13	8	3	s. 51 e.	6
Kansas City, Mo	12	29	24	9	s. 42 e.	23
Springfield, Mo	11	33	19	11	s. 20 e.	23
Topeka, Kans.*	7	15	12	3	s. 48 e.	12
Lincoln, Nebr	17	28	19	8	s. 45 e.	16
Omaha, Nebr	17	29	19	8	s. 43 e.	16
Valentine, Nebr	18	17	22	15	n. 82 e.	7
Sioux City, Iowa†	9	14	8	5	s. 31 e.	6
Pierre, S. Dak	20	19	24	12	n. 85 e.	12
Huron, S. Dak	21	19	21	13	n. 76 e.	8
Yankton, S. Dak.†	11	10	10	10	n.	1
Northern Slope.						
Havre, Mont	18	8	26	19	n. 35 e.	12
Miles City, Mont	19	13	20	21	n. 9 w.	6
Helena, Mont	22	13	7	35	n. 72 w.	29
Kalispell, Mont	25	14	8	27	n. 60 w.	22
Rapid City, S. Dak	19	17	22	16	n. 72 e.	6
Cheyenne, Wyo	15	27	10	18	s. 34 w.	14
Lander, Wyo	25	12	11	24	n. 45 w.	18
Yellowstone Park, Wyo	12	32	5	26	s. 46 w.	29
North Platte, Nebr	13	23	25	7	s. 61 e.	21
Middle Slope.						
Denver, Colo	21	26	13	12	s. 11 e.	5
Pueblo, Colo	16	21	22	17	s. 45 e.	7
Concordia, Kans	15	29	18	8	s. 36 e.	17
Dodge, Kans	12	31	25	4	s. 48 e.	28
Wichita, Kans	10	36	23	3	s. 38 e.	33
Oklahoma, Okla	10	39	17	6	s. 21 e.	31
Southern Slope.						
Abilene, Tex	6	40	17	7	s. 16 e.	35
Amarillo, Tex	3	46	19	6	s. 17 e.	45
Roswell, N. Mex	6	37	19	11	s. 14 e.	32
Southern Plateau.						
El Paso, Tex	21	12	30	16	n. 57 e.	17
Santa Fe, N. Mex	15	22	25	18	s. 45 e.	10
Flagstaff, Ariz	20	20	0	38	w.	38
Phoenix, Ariz	11	4	30	23	n. 68 e.	18
Yuma, Ariz	5	31	11	28	s. 33 w.	31
Independence, Cal	19	14	13	30	n. 74 w.	18
Middle Plateau.						
Carson City, Nev	13	21	3	37	s. 77 w.	35
Winnemucca, Nev	19	17	13	30	n. 82 w.	17
Modena, Utah	6	15	1	48	s. 79 w.	48
Salt Lake City, Utah	22	18	24	11	n. 73 e.	14
Durango, Colo	25	13	2	36	n. 71 w.	36
Grand Junction, Colo	7	23	21	20	s. 3 e.	16
Northern Plateau.						
Baker City, Oreg	22	24	17	13	s. 63 e.	4
Boise, Idaho	22	13	20	22	n. 13 w.	9
Lewiston, Idaho†	0	3	24	4	s. 81 e.	20
Pocatello, Idaho	4	25	19	25	s. 16 w.	22
Spokane, Wash	16	16	22	17	e.	5
Walla Walla, Wash	8	39	12	8	s. 7 e.	31
North Pacific Coast Region.						
North Head, Wash	31	9	2	37	n. 58 w.	41
Port Crescent, Wash.*	9	2	0	25	n. 74 w.	26
Seattle, Wash	13	24	10	22	s. 47 w.	16
Tacoma, Wash	19	15	5	34	n. 82 w.	29
Tatoosh Island, Wash	2	34	3	34	s. 44 w.	45
Portland, Oreg	21	18	9	28	n. 81 w.	19
Roseburg, Oreg	38	4	14	18	n. 7 w.	34
Middle Pacific Coast Region.						
Eureka, Cal	32	12	6	25	n. 44 w.	28
Mount Tamalpais, Cal	20	8	1	46	n. 75 w.	47
Red Bluff, Cal	20	25	22	6	s. 73 e.	17
Sacramento, Cal	1	48	18	9	s. 11 e.	48
San Francisco, Cal	1	12	0	53	s. 78 w.	54
South Pacific Coast Region.						
Fresno, Cal	40	1	0	39	n. 45 w.	55
Los Angeles, Cal	5	19	11	38	s. 63 w.	30
San Diego, Cal	16	17	5	34	s. 88 w.	29
San Luis Obispo, Cal	25	7	2	37	n. 63 w.	39
West Indies						
Grand Turk, W. I	2	10	23	0	s. 71 e.	24
Hamilton, Bermuda	8	27	20	18	s. 6 e.	19
Havana, Cuba†	2	4	27	1	s. 86 e.	26
San Juan, Porto Rico	0	19	51	0	s. 69 e.	54

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during June, 1905, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	21-22			1.63														0.50			
Alpena, Mich.	17	5:30 p. m.	9:40 p. m.	0.84	5:50 p. m.	6:10 p. m.	0.02	0.09	0.27	0.44	0.55										
Amarillo, Tex.	13	10:40 p. m.	11:30 p. m.	0.71	11:03 p. m.	11:18 p. m.	T.	0.25	0.50	0.68											
Asheville, N. C.	16-17	7:02 p. m.	11:00 a. m.	0.82	7:04 p. m.	7:24 p. m.	0.01	0.14	0.23	0.38	0.45										
Atlanta, Ga.	14	12:16 p. m.	1:50 p. m.	0.60	12:24 p. m.	12:40 p. m.	0.01	0.17	0.34	0.49	0.52										
Do.	28	3:38 p. m.	4:30 p. m.	0.58	3:49 p. m.	4:03 p. m.	0.01	0.25	0.48	0.56											
Do	30	6:34 p. m.	9:10 p. m.	1.10	6:45 p. m.	7:18 p. m.	0.02	0.06	0.18	0.33	0.39	0.41	0.54	0.65							
Atlantic City, N. J.	7			0.52														0.52			
Augusta, Ga.	28	8:25 p. m.	10:05 p. m.	0.92	8:48 p. m.	9:13 p. m.	0.05	0.07	0.23	0.47	0.60	0.71									
Baltimore, Md.	12	8:05 a. m.	12:45 p. m.	1.00	9:44 a. m.	10:15 a. m.	0.12	0.11	0.17	0.28	0.41	0.51	0.63	0.66	0.71	0.75	0.79	0.83			
Do	22	5:20 p. m.	7:55 p. m.	1.21	5:24 p. m.	6:07 p. m.	0.01	0.30	0.56	0.69	0.83	0.92	0.92	0.96	1.12						
Binghamton, N. Y.	21	D. N.	5:50 p. m.	0.99	7:48 a. m.	8:13 a. m.	0.02	0.13	0.37	0.46	0.48	0.56									
Birmingham, Ala.	27	6:12 p. m.	8:06 p. m.	0.70	6:12 p. m.	6:37 p. m.	0.00	0.14	0.37	0.51	0.58	0.65									
Do	28	1:01 p. m.	5:15 p. m.	1.55	1:28 p. m.	2:00 p. m.	0.01	0.32	0.53	0.62	0.70	0.73	0.84	0.89							
					3:00 p. m.	3:15 p. m.	0.94	0.23	0.39	0.46											
Bismarck, N. Dak.	4	7:25 p. m.	10:50 p. m.	1.34	8:53 p. m.	9:53 p. m.	0.01	0.21	0.57	0.78	0.88	0.93	0.94	1.00	1.05	1.07	1.10	1.18			
Do.	8	3:45 p. m.	7:20 p. m.	1.75	4:18 p. m.	5:55 p. m.	0.06	0.21	0.41	0.46	0.46	0.54	0.67	0.73	0.82	0.85	0.95	1.03	1.21	1.62	
Block Island, R. I.	12-13			2.74														0.46			
Boise, Idaho.	4			0.29														0.20			
Boston, Mass.	19	3:15 a. m.	11:10 a. m.	0.93	8:05 a. m.	8:30 a. m.	0.28	0.18	0.31	0.39	0.47	0.52									
Do.	26	2:44 p. m.	3:15 p. m.	0.78	2:49 p. m.	2:59 p. m.	T.	0.39	0.72	0.75											
Buffalo, N. Y.	5	5:45 p. m.	10:00 p. m.	0.84	7:32 p. m.	7:57 p. m.	0.09	0.08	0.41	0.63	0.72										
Cairo, Ill.	28	4:30 a. m.	9:50 a. m.	3.94	5:50 a. m.	6:40 a. m.	0.22	0.07	0.16	0.22	0.26	0.30	0.34	0.37	0.46	0.71	1.05				
					6:40 a. m.	7:30 a. m.		1.32	1.59	1.75	1.99	2.25	2.48	2.72	3.12	3.42	3.61				
Charles City, Iowa.	18	5:12 p. m.	7:40 p. m.	0.84	5:19 p. m.	5:47 p. m.	0.01	0.15	0.39	0.56	0.63	0.67	0.74	0.78							
Charleston, S. C.	28-29	8:45 p. m.	D. N.	0.85	1:06 a. m.	1:26 a. m.	0.12	0.15	0.35	0.41	0.58										
Charlotte, N. C.	14			0.28						0.27											
Chattanooga, Tenn.	22	3:15 p. m.	11:40 p. m.	1.13	4:46 p. m.	5:00 p. m.	0.14	0.28	0.60	0.73											
Chicago, Ill.	4	4:04 a. m.	6:35 a. m.	0.98	4:11 a. m.	4:26 a. m.	T.	0.26	0.52	0.65	0.70										
Do	25	9:10 p. m.	10:45 p. m.	0.80	9:39 p. m.	9:59 p. m.	0.03	0.25	0.46	0.58	0.68										
Cincinnati, Ohio.	11	2:19 p. m.	3:10 p. m.	0.50	2:30 p. m.	2:53 p. m.	0.01	0.14	0.24	0.33	0.42	0.46									
Cleveland, Ohio.	11	3:00 a. m.	6:10 a. m.	0.79	3:50 a. m.	4:30 a. m.	0.02	0.07	0.20	0.31	0.32	0.40	0.59	0.65	0.71	0.75					
Columbia, Mo.	29	3:20 a. m.	5:35 a. m.	1.15	5:01 a. m.	5:21 a. m.	0.53	0.16	0.36	0.49	0.60										
Do	30	2:04 p. m.	6:42 p. m.	1.34	2:05 p. m.	2:24 p. m.	0.01	0.43	0.73	0.88	0.94										
Columbia, S. C.	28			0.35						0.29											
Columbus, Ohio.	19			0.51														0.51			
Concord, N. H.	19			0.85														0.55			
Corpus Christi, Tex.	21	1:08 p. m.	3:42 p. m.	1.41	1:30 p. m.	2:10 p. m.	0.04	0.06	0.41	0.51	0.65	0.83	1.00	1.14	1.24						
Do	22	1:31 p. m.	2:18 p. m.	1.16	1:41 p. m.	2:01 p. m.	0.01	0.46	0.70	0.94	1.11										
Do	25	3:24 p. m.	5:15 p. m.	0.68	3:31 p. m.	3:51 p. m.	0.01	0.22	0.44	0.59	0.65										
Davenport, Iowa.	9-10	6:10 p. m.	8:15 a. m.	4.00	7:25 p. m.	7:55 p. m.	0.13	0.06	0.17	0.39	0.50	0.72	0.92								
					9:27 p. m.	9:57 p. m.	1.31	0.25	0.61	1.05	1.36	1.55	1.64								
Denver, Colo.	30			0.09				0.09													
Des Moines, Iowa.	9	3:56 p. m.	7:55 p. m.	0.70	6:02 p. m.	6:17 p. m.	0.17	0.29	0.45	0.50											
Do	29	1:25 a. m.	5:50 a. m.	1.11	4:08 a. m.	5:32 a. m.	0.04	0.23	0.36	0.38	0.40	0.43	0.46	0.51	0.57	0.59	0.62	0.71	1.00		
Detroit, Mich.	5-6			2.94														0.58			
Dodge, Kans.	29-30			0.52														0.41			
Dubuque, Iowa.	18-19			0.84														0.56			
Duluth, Minn.	13-14	9:42 p. m.	4:45 a. m.	2.66	9:59 p. m.	11:12 p. m.	0.01	0.10	0.24	0.36	0.38	0.54	0.66	0.71	0.80	1.00	1.17	1.54	2.08		
Eastport, Me.	25			0.30														0.26			
Elkins, W. Va.	11-12			0.99														0.58			
Erie, Pa.	5-6			1.21														0.26			
Escanaba, Mich.	25	9:40 a. m.	10:45 a. m.	1.20	10:08 a. m.	10:40 a. m.	0.12	0.22	0.55	0.61	0.70	0.89	1.04								
Evansville, Ind.	26			0.59									0.38								
Fort Smith, Ark.	16	3:08 a. m.	4:33 a. m.	0.74	3:27 a. m.	3:50 a. m.	0.07	0.12	0.29	0.47	0.56	0.61									
Fort Worth, Tex.	20			0.93									0.34								
Galveston, Tex.	21-22	10:15 p. m.	10:10 a. m.	2.29	7:00 a. m.	7:20 a. m.	1.35	0.09	0.20	0.36	0.45										
Do	24-25	2:57 p. m.	1:30 p. m.	3.64	2:05 a. m.	2:40 a. m.	1.04	0.06	0.12	0.25	0.36	0.55	0.65	0.72							
					5:15 a. m.	5:45 a. m.	2.11	0.06	0.12	0.35	0.48	0.60	0.65								
Grand Rapids, Mich.	5	12:50 a. m.	4:15 a. m.	1.20	2:52 a. m.	3:48 a. m.	0.13	0.14	0.32	0.39	0.42	0.45	0.46	0.49	0.69	0.91	0.96	1.05			
Do	5-6	5:30 p. m.	4:30 a. m.	3.56	9:51 p. m.	10:22 p. m.	1.28	0.06	0.17	0.38	0.59	0.81	0.97								
Green Bay, Wis.	5			0.47														0.46			
Hannibal, Mo.	29			0.75														0.57			
Harrisburg, Pa.	22	12:08 p. m.	1:16 p. m.	0.86	12:25 p. m.	12:47 p. m.	0.02	0.20	0.51	0.59	0.69	0.77									
Hartford, Conn.	12	6:02 a. m.	9:45 a. m.	1.79	6:35 a. m.	8:00 a. m.	0.04	0.10	0.26	0.43	0.54	0.56	0.60	0.72	0.94	1.16	1.38	1.52	1.73		
Hatteras, N. C.	25	12:45 a. m.	3:25 a. m.	1.00	12:49 a. m.	1:14 a. m.	0.01	0.15	0.25	0.48	0.69	0.80									
Huron, S. Dak.	27	4:40 a. m.	10:37 a. m.	3.43	4:57 a. m.	5:12 a. m.	0.05	0.09	0.32	0.50											
					6:37 a. m.	7:53 a. m.	0.66	0.13	0.24	0.49	0.76	1.07	1.31	1.45	1.55	1.62	1.70	2.12	2.52		
Indianapolis, Ind.	17	9:26 p. m.	D. N.	1.27	9:30 p. m.	9:48 p. m.	0.01	0.29	0.54	0.80	0.92										
Do	20	1:08 p. m.	6:30 p. m.	1.12	2:05 p. m.	2:33 p. m.	0.10	0.06	0.15	0.25	0.38	0.49									
Jacksonville, Fla.	9	12:55 a. m.	2:15 a. m.	1.40	12:58 a. m.	1:28 a. m.	0.01	0.11	0.49	0.82	1.03	1.24	1.35								
Jupiter, Fla.	19	10:30 a. m.	1:45 p. m.	0.93	11:05 a. m.	11:20 a. m.	0.04	0.27	0.54	0.64	0.68										
Kansas City, Mo.	18-19			0.82														0.60			
Key West, Fla.	3			1.58														0.60			
Knoxville, Tenn.	7			0.85														0.75			
La Crosse, Wis.	16-17	11:35 p. m.	D. N.	0.95	12:07 a. m.	12:32 a. m.	0.08	0.08	0.26	0.44	0.62	0.73									
La Salle, Ill.	9-10			2.67														0.64			
Lexington, Ky.	11	6:15 p. m.	8:30 p. m.	0.84	7:30 p. m.	8:16 p. m.	0.07	0.26	0.40	0.43	0.44	0.50	0.59	0.62	0.65	0.73					
Lincoln, Nebr.	19	8:09 p. m.	11:15 p. m.	1.69	8:54 p. m.	9:32 p. m.	0.42	0.15	0.33	0.47	0.59	0.70	0.87	1.00							
Little Rock, Ark.	20	3:52 p. m.	6:15 p. m.	0.63	4:00 p. m.	4:15 p. m.	0.03	0.10	0.29	0.58											
Los Angeles, Cal.	†																				
Louisville, Ky.	19			1.06														*			
Lynchburg, Va.	19	8:45 p. m.	10:05 p. m.	0.81	8:51 p. m.	9:11 p. m.	0.01	0.24	0.40	0.58	0.77										
Do	23	10:35 p. m.	11:30 p. m.	0.64	10:53 p. m.	11:12 p. m.	0.01	0.29	0.52	0.58	0.63										
Do	24	3:33 p. m.	6:20 p. m.	2.44	4:44 p. m.	5:29 p. m.	0.05	0.19	0.58	1.14	1.61	1.85	2.04	2.19	2.25	2.31					
Macon, Ga.	30	4:25 p. m.	5:55 p. m.	1.17	4:50 p. m.	5:15 p. m.	0.01	0.08	0.26	0.66	1.00	1.12									
Madison, Wis.	18	6:30 p. m.	7:25 p. m.	0.95	6:48 p. m.	7:08 p. m.	0.11	0.05	0.37	0.67	0.80										
Memphis, Tenn.	7	7:40 a. m.	9:05 a. m.	1.57	8:11 a. m.	8:38 a. m.	0.03	0.13	0.46	0.72	1.02	1.39	1.45								
Do	21	4:10 p. m.	7:15 p. m.	1.36	4:54 p. m.	5:38 p. m.	0.11	0.10	0.20	0.32	0.51	0.63	0.81	0.94	1.04	1.12					
Meridian, Miss.	18			0.59											0.56						
Milwaukee, Wis.	4	12:05 a. m.	3:30 a. m.	0.88	1:59 a. m.	2:55 a. m.	0.06	0.05	0.14	0.20	0.30	0.43	0.47	0.49	0.51	0.57	0.65	0.76			
Do	18	7:35 p. m.	9:35 p. m.	0.65	8:57 p. m.	9:12 p. m.	0.06	0.30	0.47	0.55	0.66										
Minneapolis, Minn.	4-5	9:45 p. m.	D. N.	1.31	2:27 a. m.	3:00 a. m.	0.39	0.13	0.32	0.44	0.49	0.55	0.68	0.72							
Do	16	4:10 p. m.	6:05 p. m.	0.80	5:30 p. m.	5:55 p. m.	0.08	0.10	0.24	0.46	0.60	0.72									
Montgomery, Ala.	13	1:50 p. m.	6:00 p. m.	1.71	1:50 p. m.	2:10 p. m.	0.00	0.31	0.80	1.12	1.24										
Do	30	2:10 p. m.	3:00 p. m.	0.72	2:30 p. m.	2:50 p. m.	0.14	0.14	0.33	0.47	0.58										
Mount Weather, Va.	22	2:50 p. m.	8:30 p. m.	1.83	2:55 p. m.	3:14 p. m.	T.	0.30	0.58	0.86	1.09										
					3:53 p. m.	4:06 p. m.	1.10	0.16	0.50	0.59											
Nantucket, Mass.	19	1:48 a. m.	9:12 a. m.	3.74	1:58 a. m.	2:53 a. m.	0.01	0.14	0.24	0.30	0.31	0.32	0.34	0.44	0.51	0.57	0.84	0.95			
					4:13 a. m.	5:28 a. m.	1.05	0.13	0.26	0.45	0.51	0.55	0.60	0.75	0.94	1.18	1.44	1.81	2.16		
Nashville, Tenn.	15	11:21 a. m.	2:30 p. m.	2.12	11:39 a. m.	12:27 p. m.	0.02	0.27	0.67	1.01	1.15	1.33	1.44	1.54	1.66	1.76					

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
New Haven, Conn.	12	9:40 a. m.	5:20 p. m.	1.90	12:07 p. m.	1:00 p. m.	0.25	0.07	0.26	0.40	0.49	0.53	0.59	0.65	0.75	0.87	0.98	1.08	.....	.....	.....
New Orleans, La.	4	11:57 a. m.	12:38 p. m.	1.09	12:12 p. m.	12:33 p. m.	0.01	0.24	0.49	0.70	1.05	1.11	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	15	3:01 p. m.	4:05 p. m.	0.99	3:15 p. m.	3:30 p. m.	0.01	0.41	0.75	0.91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	21	2:42 p. m.	7:25 p. m.	1.22	4.12 p. m.	5:12 p. m.	0.03	0.13	0.22	0.33	0.38	0.47	0.56	0.68	0.73	0.78	0.85	1.04	.....	.....	.....
New York, N. Y.	22	3:04 p. m.	4:03 p. m.	0.66	3:19 p. m.	3:34 p. m.	T.	0.25	0.61	0.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk, Va	12–13	6:00 p. m.	1:00 a. m.	1.33	6:15 p. m.	6:44 p. m.	0.02	0.08	0.19	0.37	0.68	0.84	0.90	.....	.....	.....	.....	.....	.....	.....	.....
Northfield, Vt.	5–6	.....	.....	1.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.70	.....	.....	.....
North Head, Wash	24	.....	.....	0.62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.21	.....	.....	.....
Oklahoma, Okla.	6–7	.....	.....	1.03	.....	.....	.....	.....	0.32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Omaha, Nebr.	9–10	.....	.....	0.76	.....	.....	.....	.....	.....	.....	0.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palestine, Tex.	20	8:22 p. m.	D. N.	0.85	8:53 p. m.	9:13 p. m.	0.18	0.21	0.40	0.50	0.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	21–22	3:48 p. m.	10:00 a. m.	1.02	4:43 a. m.	5:18 a. m.	0.26	0.12	0.21	0.25	0.31	0.41	0.56	0.62	.....	.....	.....	.....	.....	.....	.....
Parkersburg, W. Va.	15–16	.....	.....	0.92	.....	.....	.....	.....	.....	.....	.....	.....	0.41	.....	.....	.....	.....	.....	.....	.....	.....
Pensacola, Fla.	16	.....	.....	0.30	.....	.....	.....	.....	.....	0.29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peoria, Ill	9–10	1:47 p. m.	11:25 a. m.	3.78	10:25 p. m.	10:50 p. m.	0.11	0.31	0.53	0.63	0.70	0.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia, Pa.	7	.....	.....	0.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.34	.....	.....	.....
Pittsburg, Pa.	16	7:40 p. m.	9:15 p. m.	1.54	7:45 p. m. 8:48 p. m.	8:10 p. m. 9:05 p. m.	0.02 0.85	0.14 0.27	0.18 0.57	0.30 0.61	0.62 0.68	0.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland, Me	26	10:35 a. m.	6:00 p. m.	0.85	1:26 p. m.	1:44 p. m.	0.16	0.07	0.18	0.39	0.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland, Oreg.	24	.....	.....	0.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.39	.....	.....	.....
Pueblo, Colo.	19–20	11:20 p. m.	D. N.	0.67	11:56 p. m.	12:21 a. m.	0.07	0.06	0.25	0.40	0.52	0.58	.....	.....	.....	.....	.....	.....	.....	.....	.....
Raleigh, N. C.	23–24	6:20 p. m.	D. N.	0.88	6:29 p. m.	6:44 p. m.	T.	0.32	0.45	0.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richmond, Va	23	3:18 p. m.	4:28 p. m.	1.69	3:29 p. m.	4:00 p. m.	0.01	0.13	0.31	0.51	0.79	1.23	1.58	1.61	.....	.....	.....	.....	.....	.....	.....
Rochester, N. Y.	18	12:33 p. m. 4:29 p. m.	2:24 p. m. 6:13 p. m.	1.32 0.86	1:10 p. m. 4:52 p. m.	1:40 p. m. 5:22 p. m.	0.08 0.03	0.10 0.27	0.20 0.39	0.35 0.42	0.42 0.47	0.71 0.51	0.98 0.58	.....	.....	.....	.....	.....	.....	.....	.....
Sacramento, Cal.	†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo	20	10:45 a. m.	1:35 p. m.	1.07	12:15 p. m.	12:35 p. m.	0.29	0.08	0.29	0.52	0.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	30	3:12 p. m.	4:58 p. m.	0.83	3:22 p. m.	3:57 p. m.	0.01	0.19	0.21	0.22	0.44	0.58	0.70	.....	.....	.....	.....	.....	.....	.....	.....
St. Paul, Minn	16	.....	.....	0.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.65	.....	.....	.....
Salt Lake City, Utah	17	.....	.....	0.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.07	.....	.....	.....
San Antonio, Tex	21	2:10 p. m.	3:30 p. m.	0.82	2:21 p. m.	2:55 p. m.	0.05	0.12	0.19	0.25	0.38	0.51	0.61	0.68	.....	.....	.....	.....	.....	.....	.....
Do	25–26	8:00 p. m.	5:58 p. m.	3.04	10:26 a. m.	10:56 a. m.	1.44	0.09	0.27	0.48	0.66	0.74	0.91	.....	.....	.....	.....	.....	.....	.....	.....
San Diego, Cal.	22	.....	.....	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sandusky, Ohio	6	4:40 p. m.	5:45 p. m.	0.54	5:19 p. m.	5:38 p. m.	0.08	0.12	0.27	0.38	0.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	15–16	11:45 p. m.	8:10 a. m.	1.24	1:20 a. m.	1:43 a. m.	0.17	0.09	0.24	0.34	0.44	0.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Cal	†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savannah, Ga	27–28	.....	.....	1.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.56	.....	.....	.....
Scranton, Pa	5–6	.....	.....	0.41	.....	.....	.....	.....	.....	.....	.....	.....	0.35	.....	.....	.....	.....	.....	.....	.....	.....
Seattle, Wash	3	.....	.....	1.42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.30	.....	.....	.....
Shreveport, La	18	2:40 p. m.	6:25 p. m.	1.10	2:45 p. m.	3:30 p. m.	0.01	0.10	0.26	0.40	0.60	0.75	0.84	0.88	0.97	1.03	.....	.....	.....	.....	.....
Spokane, Wash.	2–3	.....	.....	0.64	.....	.....	.....	.....	0.33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springfield, Ill	10	7:08 a. m.	10:25 a. m.	1.40	7:13 a. m.	7:58 a. m.	0.02	0.08	0.15	0.30	0.36	0.39	0.46	0.55	0.70	0.79	.....	.....	.....	.....	.....
Springfield, Mo	29	D. N.	D. N.	1.30	3:54 a. m.	4:29 a. m.	T.	0.14	0.27	0.43	0.54	0.64	0.89	1.05	.....	.....	.....	.....	.....	.....	.....
Syracuse, N. Y.	18	3:44 p. m.	6:20 p. m.	1.05	4:08 p. m.	4:38 p. m.	0.07	0.12	0.28	0.44	0.61	0.81	0.88	.....	.....	.....	.....	.....	.....	.....	.....
Tampa, Fla	20	1:50 p. m.	3:45 p. m.	3.50	2:04 p. m.	2:58 p. m.	0.01	0.12	0.17	0.45	0.62	0.90	1.32	1.71	2.30	2.57	3.00	3.13	3.37	3.49	.....
Do	21–22	9:45 p. m.	1:10 a. m.	0.95	9:48 p. m.	10:19 p. m.	0.01	0.21	0.36	0.48	0.61	0.70	0.77	.....	.....	.....	.....	.....	.....	.....	.....
Do	30	12:15 p. m.	1:25 p. m.	0.86	12:28 p. m.	12:52 p. m.	0.03	0.18	0.42	0.60	0.72	0.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taylor, Tex.	25–26	.....	.....	2.36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.43	.....	.....	.....
Toledo, Ohio	6	5:14 p. m.	5:55 p. m.	0.77	5:33 p. m.	5:48 p. m.	T.	0.25	0.60	0.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Topeka, Kans.	18	8:33 p. m.	9:45 p. m.	0.47	8:55 p. m.	9:14 p. m.	0.01	0.10	0.19	0.27	0.44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Valentine, Nebr.	27	4:17 a. m.	6:20 a. m.	1.47	4:45 a. m.	5:24 a. m.	0.05	0.18	0.40	0.62	0.80	1.08	1.13	1.26	1.30	.....	.....	.....	.....	.....	.....
Vicksburg, Miss	18	2:14 p. m.	3:10 p. m.	0.85	2:24 p. m.	2:39 p. m.	0.03	0.15	0.53	0.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	25–26	2:09 p. m.	D. N.	1.39	2:17 p. m.	3:42 p. m.	T.	0.25	0.50	0.71	0.89	0.95	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington, D. C.	22	5:58 p. m.	9:00 p. m.	1.06	6:43 p. m.	6:53 p. m.	0.20	0.37	0.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	26	4:18 p. m.	5:10 p. m.	1.22	4:27 p. m.	4:52 p. m.	T.	0.23	0.50	0.81	1.10	1.17	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wichita, Kans	2	1:45 a. m.	5:12 a. m.	1.33	1:51 a. m.	2:21 a. m.	T.	0.23	0.57	0.80	0.89	0.96	1.01	.....	.....	.....	.....	.....	.....	.....	.....
Do	15	8:20 p. m.	11:10 p. m.	2.16	8:58 p. m.	9:58 p. m.	0.02	0.18	0.45	0.81	1.02	1.18	1.35	1.55	1.72	1.88	1.99	2.10	.....	.....	.....
Williston, N. Dak.	2	.....	.....	0.39	.....	.....	.....	.....	.....	.....	.....	.....	0.32	.....	.....	.....	.....	.....	.....	.....	.....
Wilmington, N. C.	25	11:37 a. m.	12.55 p. m.	0.95	12:06 p. m.	12:24 p. m.	0.01	0.25	0.63	0.71	0.79	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wytheville, Va	19	.....	.....	0.52	.....	.....	.....	.....	.....	0.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yankton, S. Dak	27	9:45 a. m.	2.05 p. m.	1.37	9:57 a. m.	10:30 a. m.	0.05	0.14	0.22	0.25	0.48	0.81	0.94	.....	.....	.....	.....	.....	.....	.....	.....
Havana, Cuba	22	.....	.....	0.39	.....	.....	.....	.....	.....	.....	.....	.....	0.38	.....	.....	.....	.....	.....	.....	.....	.....
San Juan, Porto Rico	17	11:50 a. m.	12.30 p. m.	0.59	11:54 a. m.	12:14 p. m.	0.01	0.13	0.36	0.50	0.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Self-register not working † No precipitation during the month.

TABLE V.—*Data furnished by the Canadian Meteorological Service, June, 1905.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	29.75	29.89	—.02	50.1	— 1.5	59.2	41.0	5.37	+1.77	
Sydney, C. B. I.	29.90	29.94	—.01	52.6	— 2.8	62.5	42.8	3.10	—0.13	
Halifax, N. S.	29.85	29.96	+.01	54.4	— 3.3	63.8	45.0	4.97	+1.21	
Grand Manan, N. B	29.86	29.91	—.02	53.4	— 2.8	61.2	45.5	4.24	+1.30	
Yarmouth, N. S	29.88	29.95	.00	52.9	— 2.1	60.8	44.9	3.61	+0.85	
Charlottetown, P. E. I.	29.89	29.93	+.01	55.1	— 2.3	62.7	47.4	2.88	+0.21	
Chatham, N. B	29.87	29.89	.00	58.5	— 1.5	69.9	47.2	3.34	—0.12	
Father Point, Que.	29.86	29.88	+.01	52.5	— 0.5	60.3	44.7	3.57	+0.59	
Quebec, Que.	29.58	29.90	—.02	60.4	— 0.8	71.0	49.9	2.99	—0.66	
Montreal, Que.	29.70	29.90	—.04	63.8	— 1.1	72.0	55.6	3.18	—0.35	
Rockliffe, Ont.	29.32	29.85	—.09	65.2	+ 1.6	75.7	50.6	3.90	+0.74	
Ottawa, Ont	29.57	29.89	—.05	65.2	— 0.1	74.5	55.9	4.23	+1.31	
Kingston, Ont.	29.62	29.93	—.04	60.0	— 3.4	67.3	52.8	5.61	+3.18	
Toronto, Ont	29.57	29.94	—.03	63.6	+ 0.2	73.5	53.7	3.19	+0.39	
White River, Ont	28.65	29.95	+.01	55.4	— 3.3	70.2	40.7	0.85	—1.37	
Port Stanley, Ont	29.33	29.97	.00	62.8	— 1.0	72.0	53.5	3.25	+0.52	
Saugeen, Ont.	29.26	29.96	—.01	59.4	— 1.0	68.2	50.6	3.57	+1.22	
Parry Sound, Ont	29.21	29.94	—.02	62.9	+ 1.2	73.6	52.4	1.57	—0.85	
Port Arthur, Ont.	29.26	29.97	+.03	54.6	— 1.8	64.4	44.8	2.36	—0.37	
Winnipeg, Man	29.09	29.91	+.02	58.5	— 3.7	69.3	47.6	4.62	+1.39	
Minnedosa, Man	28.12	29.91	+.02	57.5	— 2.1	68.5	46.4	3.51	+0.51	
Qu'Appelle, Assin.	27.65	29.88	+.01	56.1	— 3.8	66.7	45.4	5.16	+1.74	
Medicine Hat, Assin.	27.62	29.88	+.03	59.2	— 2.8	71.9	46.5	3.93	+1.17	
Swift Current, Assin.	27.35	29.89	+.02	57.7	— 2.3	69.5	45.9	3.62	+0.95	
Calgary, Alberta	26.40	29.91	+.07	52.9	— 3.1	65.3	40.5	5.81	+3.36	3.0
Banff, Alberta	25.37	29.92	+.08	49.7	— 1.8	61.4	38.1	3.91	+0.58	
Edmonton, Alberta	27.61	29.87	+.03	56.4	— 0.5	68.9	43.9	4.36	+1.50	
Prince Albert, Sask.	28.31	29.85	—.02	55.3	— 2.4	68.1	42.5	1.79	—0.72	
Battleford, Sask.	28.20	29.93	+.07	56.5	— 3.0	67.7	45.4	3.13	—0.18	
Kamloops, B. C.	28.66	29.86	—.01	65.5	+ 1.7	76.7	54.2	0.82	—0.60	
Victoria, B. C.	29.91	30.00	—.01	56.7	+ 0.4	62.8	50.5	1.06	—0.14	
Barkerville, B. C.	25.68	29.97	+.10	49.9	— 0.8	62.3	37.4	4.14	+0.66	
Hamilton, Bermuda	29.92	30.08	—.04	75.6	+ 0.6	81.1	70.2	4.92	—1.03	

TABLE VI.—*Heights of rivers referred to zeros of gages, June, 1905.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Milk River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Havre, Mont.	237	9	3.8	30	3.1	25	3.4	0.7
Musselshell River.								
Musselshell, Mont.	87	9	4.0	10	0.4	1,2	1.5	3.6
Yellowstone River.								
Billings, Mont.	330	8	7.0	10	3.8	1	5.8	3.2
Glendive, Mont.	78	17	9.9	8	5.1	1	8.3	4.8
Cheyenne River.								
Rousseau, S. Dak	7	9	7.0	21	0.1	14	2.1	6.9
James River.								
Lamoure, N. Dak.	330	14	— 0.1	29, 30	— 1.3	1	—0.5	1.2
Huron, S. Dak.	139	9	6.6	28	0.9	24	1.8	5.7
Big Blue River.								
Beatrice, Nebr.	92	14	6.3	1	2.3	13	3.4	4.0
Blue Rapids, Kans.	47	14	17.9	1	6.1	15	8.1	11.8
Republican River.								
Clay Center, Kans.	42	18	14.0	29	7.3	14, 15	9.9	6.7
Solomon River.								
Beloit, Kans.	75	16	16.1	1	2.1	15, 16, 29	5.4	14.0
Smoky Hill River.								
Lindsborg, Kans.	109	20	6.5	19	2.5	28	3.7	4.0
Abilene, Kans.	45	22	16.5	4	3.4	16	9.2	13.1
Kansas River.								
Manhattan, Kans.	116	18	12.2	1	4.2	15, 16	7.3	8.0
Topeka, Kans.	87	21	14.4	2	7.6	15	10.3	6.8
Osage River.								
Bagnell, Mo.	70	28	9.2	1	2.0	20-22	3.4	7.2
Gasconade River.								
Arlington, Mo.	98	16	1.4	1	0.1	29	0.6	1.3
Missouri River.								
Townsend, Mont.	2,504	11	5.5	15,16,19,20	3.5	1	4.9	2.0
Fort Benton, Mont.	2,285	12	3.8	11	1.8	1	3.0	2.0
Wolf Point, Mont.	1,952	17	3.3	10	— 0.2	3,4	2.2	3.5
Bismarck, N. Dak.	1,309	14	8.0	10	3.2	1	6.3	4.8
Pierre, S. Dak.	1,114	14	8.7	21	3.5	1	7.2	5.2
Sioux City, Iowa	784	19	11.7	14, 30	7.0	8-10	9.7	4.7
Blair, Nebr.	705	15	11.5	24	7.0	9, 11, 12	9.4	4.5
Omaha, Nebr.	669	10	10.8	24, 26	7.0	12	9.0	3.8
Plattsmouth, Nebr.	641	17	8.8	25	5.3	10, 11	7.0	3.5
St. Joseph, Mo.	481	10	9.4	26	5.4	12	7.4	4.0
Kansas City, Mo.	388	21	17.3	27	11.6	13	14.7	5.7
Glasgow, Mo.	231	18	14.4	29	10.1	14	12.1	4.3
Boonville, Mo.	199	20	15.2	29	10.2	15	12.7	5.0
Hermann, Mo.	103	24	14.8	30	9.7	16	12.2	5.1
Minnesota River.								
Mankato, Minn.	127	18	6.4	27	3.9	24	4.9	2.5
St. Croix River.								
Stillwater, Minn.	23	11	11.6	30	7.4	5,6	10.0	4.2
Chippewa River.								
Chippewa Falls, Wis.	75	16	17.5	6	2.2	30	7.1	15.3
Red Cedar River.								
Cedar Rapids, Iowa	77	14	5.8	23	4.0	12	4.8	1.8
Iowa River.								
Iowa City, Iowa.	57	.....	8.5	10	1.0	30	3.0	7.5
Des Moines River.								
Des Moines, Iowa.	205	19	7.3	3	3.6	28	5.1	3.7
Illinois River.								
La Salle, Ill.	197	18	18.1	1	14.2	30	16.5	3.9
Peoria, Ill.	135	14	14.9	1	11.9	30	13.7	3.0
Beardstown, Ill.	70	12	14.1	14, 15	11.4	30	12.8	2.7
Red Bank Creek.								
Brookville, Pa.	42	8	1.6	19, 22	0.5	29, 30	1.0	1.1
Clarion River.								
Clarion, Pa.	32	10	4.0	23	0.7	6	2.2	3.3
Conemaugh River.								
Johnstown, Pa.	64	7	4.9	7	1.8	6	2.9	3.1
Allegheny River.								
Warren, Pa.	177	14	5.4	23	0.8	3-5	2.4	4.6
Franklin, Pa.	114	15	6.0	22	1.0	4,5	3.0	5.0
Parker, Pa.	73	20	6.1	23	1.0	5,6	3.0	5.1
Freeport, Pa.	29	20	13.0	23	2.4	6	5.9	10.6
Springdale, Pa.	17	27	15.7	23	7.0	6	10.0	8.7
Cheat River.								
Rowlesburg, W. Va.	36	14	5.6	27	2.5	17	3.4	3.1
Youghiogheny River.								
Confluence, Pa.	59	10	3.0	24	0.7	6	1.4	2.3
West Newton, Pa.	15	23	6.5	12	1.1	1,6	2.5	5.4
Monongahela River.								
Weston, W. Va.	161	18	0.9	1	— 0.6	18-21	0.0	1.5
Fairmont, W. Va.	119	25	17.2	1	14.2	12	15.0	3.0
Greensboro, Pa.	81	18	9.8	25	6.8	21	8.0	3.0
Lock No. 4, Pa.	40	28	10.9	2	6.5	18	8.0	4.4
Beaver River.								
Ellwood Junction, Pa.	10	14	4.2	24	1.0	1,2	2.8	3.2
Muskingum River.								
Zanesville, Ohio	70	25	15.2	21	8.6	4,5,8	10.8	6.6
Little Kanawha River.								
Glenville, W. Va.	77	20	1.6	12	0.0	{5,8,9,13,} {17, 20, 29}	0.6	1.6
Creston, W. Va.	38	20	4.4	21-23	2.6	9, 10	3.6	1.8
New River.								
Radford, Va.	155	14	1.7	20	— 0.3	16	0.4	2.0
Hinton, W. Va.	95	14	3.1	25	1.4	16	1.9	1.7
Great Kanawha River.								
Charleston, W. Va.	58	30	7.9	26	4.9	29	6.9	3.0
Scioto River.								
Columbus, Ohio.	110	17	6.0	6,7	2.5	30	3.8	3.5
Licking River.								
Falmouth, Ky.	30	25	8.2	24	0.8	10, 11	2.7	7.4
Miami River.								
Dayton, Ohio.	77	18	3.9	6	1.2	30	2.0	2.7
Kentucky River.								
Jackson, Ky.	287	24	9.0	21-23	5.5	1-18	6.2	3.5
Beattyville, Ky.	254	30	4.0	27, 28	0.5	19-21	1.3	3.5
High Bridge, Ky.	117	17	13.0	29	9.1	9-11	10.2	3.9

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Kentucky River.—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Frankfort, Ky.	65	31	8.8	29	5.8	10, 11	6.6	3.0
Wabash River.								
Terre Haute, Ind.	171	16	8.4	21	1.8	30	4.6	6.6
Mount Carmel, Ill.	75	15	8.4	5	4.3	18, 19	6.1	4.1
Cumberland River.								
Burnside, Ky.	518	50	6.6	28	— 0.1	18, 19	1.7	6.7
Celina, Tenn.	383	45	9.2	25	1.5	15, 16, 18	3.6	7.7
Carthage, Tenn.	308	40	9.6	24	1.8	14	4.1	7.8
Nashville, Tenn.	193	40	15.4	25	7.9	15	10.2	7.5
Clarksville, Tenn.	126	42	20.4	29	4.5	15	9.6	15.9
Powell River.								
Tazewell, Tenn.	44	20	1.4	24	0.4	16, 17	0.8	1.0
Clinch River.								
Speers Ferry, Va.	156	20	0.5	21	— 0.5	30	—0.1	1.0
Clinton, Tenn.	52	25	5.4	24	3.7	19	4.3	1.7
South Fork Holston River.								
Bluff City, Tenn.	35	15	1.3	1	0.5	6, 7, 16	0.8	0.8
Holston River.								
Rotherwood, Tenn.	142	14	1.1	21	0.2	12	0.7	0.9
Rogersville, Tenn.	103	14	2.3	1, 2, 25, 27	1.7	12	2.0	0.6
French Broad River.								
Asheville, N. C.	144	6	3.0	17	— 0.4	8-15	0.3	3.4
Leadvale, Tenn. (3)	70	15	.....	.....	— 1.0	12	0.2	.....
Dandridge, Tenn.	46	15	3.3	18	0.9	11, 12, 16	1.5	2.4
Little Tennessee River.								
McGhee, Tenn.	17	20	5.0	28	3.0	11, 15	3.5	2.0
Hiwassee River.								
Charleston, Tenn.	18	22	6.4	30	1.4	14	2.9	5.0
Tennessee River.								
Knoxville, Tenn.	635	29	5.2	27	1.1	12	2.1	4.1
Loudon, Tenn.	590	25	4.5	28	1.4	11, 12	2.2	3.1
Kingston, Tenn.	556	25	4.7	28	1.8	12, 13	2.6	2.9
Chattanooga, Tenn.	452	33	6.0	23, 29	2.9	13	4.3	3.1
Bridgeport, Ala.	402	24	4.5	30	1.3	13	2.6	3.2
Guntersville, Ala.	349	31	7.9	24	3.2	15	5.3	4.7
Florence, Ala.	255	16	6.1	30	1.3	15, 16	3.0	4.8
Riverton, Ala.	225	26	9.6	30	3.3	15, 17	5.5	6.3
Johnsonville, Tenn.	95	21	9.0	30	2.9	16, 17	5.6	6.1
Ohio River.								
Pittsburg, Pa.	966	22	10.7	23	3.2	16	5.9	7.5
Davis Island Dam, Pa.	960	25	11.7	23	4.0	6	6.8	7.7
Beaver Dam, Pa.	925	27	16.0	23	5.1	6	9.0	10.9
Wheeling, W. Va.	875	36	16.3	24	5.0	2,7	8.7	11.3
Parkersburg, W. Va.	785	36	16.8	25	6.3	3	9.5	10.5
Point Pleasant, W. Va.	703	39	17.8	26	4.8	9	9.3	13.0
Huntington, W. Va.	660	50	21.7	26, 27	8.7	9, 10	13.2	13.0
Catlettsburg, Ky.	651	50	21.9	27	7.1	10	12.5	14.8
Portsmouth, Ohio.	612	50	22.5	27	10.0	10	14.3	12.5
Mayasville, Ky.	559	50	22.2	27	9.7	11	14.0	12.5
Cincinnati, Ohio.	499	50	24.2	28	11.9	12	16.3	12.3
Madison, Ind.	413	46	20.2	28, 29	10.7	13	13.9	9.5
Louisville, Ky.	367	28	8.6	29	5.1	14	6.5	3.5
Evansville, Ind.	184	35	18.7	30	9.0	16	11.6	9.7
Mount Vernon, Ind.	148	35	17.5	30	8.9	17	11.1	8.6
Paducah, Ky.	47	40	18.0	30	10.1	13-17	12.6	7.9
Cairo, Ill.	1	45	29.1	1, 30	22.3	13, 14	24.9	6.8
St. Francis River.								
Marked Tree, Ark.	104	17	15.4	1	9.3	27, 28	11.9	6.1
Neosho River.								
Neosho Rapids, Kans.	326	22	8.9	4	0.2	15-17	1.4	8.7
Iola, Kans.	262	10	3.3	6	0.3	17, 18	1.0	3.0
Oswego, Kans.	184	20	4.5	1	0.6	15, 26	1.8	3.9
Fort Gibson, Ind. T.	3	22	20.0	1	12.4	21, 30	14.4	7.6
Canadian River.								
Calvin, Ind. T.	99	10	6.0	1	2.1	28	3.0	3.9
Black River.								
Blackrock, Ark.	67	12	9.0	1	3.0	22, 23	4.4	6.0
White River.								
Calicorock, Ark.	272	15	12.5	1	1.0	28, 29	3.2	11.5
Batesville, Ark.	217	18	14.5	2	3.3	26-29	5.6	11.2
Newport, Ark.	185	26	21.8	1, 2	3.2	28	8.4	18.6
Clarendon, Ark.	75	30	30.1	3	18.8	24	24.7	11.3
Arkansas River.								
Pueblo, Colo (4).	1,334	10	6.9	6	4.3	1	5.8	2.6
Wichita, Kans.	832	10	6.0	1	2.6	28, 30	4.0	3.4
Tulsa, Ind. T.	551	16	7.1	3	4.0	30	5.4	3.1
Webbers Falls, Ind. T.	465	23	17.4	1	6.4	30	9.6	11.0
Fort Smith, Ark.	408	22	20.7	1	6.6	30	10.9	14.1
Dardanelle, Ark.	256	21	20.6	1	6.4	30	11.1	14.2
Little Rock, Ark.	176	23	22.9	1	7.8	21	12.8	15.1
Yazoo River.								
Greenwood, Miss.	175	38	25.0	1	7.1	21	15.0	17.9
Yazoo City, Miss.	80	25	21.0	4,5	7.3	25	15.4	13.7
Ouachita River.								
Camden, Ark.	304	39	30.7	30	7.2	21, 22	15.6	23.5
Monroe, La.	122	40	44.0	1, 2	36.0	30	40.7	8.0
Red River.								
Arthur City, Tex.	688	27	23.3	1	8.8	20	12.6	14.5
Fulton, Ark.	515	28	31.5	1-3	13.2	21	22.0	18.3
Spring Bank, Ark.	441	29	32.8	1-3	21.7	22	28.5	11.1
Shreveport, La.	327	29	33.6	9	18.4	27	27.6	15.2
Alexandria, La.	118	33	35.7	18, 19	28.2	30	34.1	7.5
Mississippi River.								
St. Cloud, Minn.	2,034	4	5.5	26	1.8	2-5	3.7	3.7
St. Paul, Minn.	1,954	14	11.6	30	6.9	3,4	8.9	4.7
Red Wing, Minn.	1,914	14	10.3	10, 11	5.9	5	8.2	4.4
Reeds Landing, Minn.	1,884	12	10.1	10	5.6	5	7.7	4.5
La Crosse, Wis.	1,819	12	12.4	12	7.5	6,7	9.9	4.9
Prairie du Chien, Wis.	1,759	18	16.4	16	8.9	8,9	12.5	7.5
Dubuque, Iowa.	1,699	18	17.4	18, 19	9.8	9-11	13.4	7.6
Clinton, Iowa.	1,629	16	15.7	21	9.3	12, 13	12.3	6.4
Leclaire, Iowa.	1,609	10	10.6	21, 22	6.0	12	8.2	4.6
Davenport, Iowa.	1,593	15	14.2	21, 22	8.7	13	11.3	5.5
Muscatine, Iowa.	1,562	16	14.9	22	10.4	14	12.5	4.5

TABLE VI.—*Heights of rivers referred to zeros of gages.*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Galland, Iowa	1,472	8	8.4	10	5.5	18	6.6	2.9
Keokuk, Iowa	1,463	15	18.4	10	10.0	18	12.1	8.4
Warsaw, Ill	1,458	18	21.3	10	12.9	17	15.0	8.4
Hannibal, Mo	1,402	13	18.3	12	11.3	10	13.0	7.0
Grafton, Ill	1,306	23	18.3	16	14.1	11	15.6	4.2
St. Louis, Mo	1,264	30	22.2	30	17.6	11	19.7	4.6
Chester, Ill	1,189	30	18.7	30	15.4	12	17.1	3.3
Cape Girardeau, Mo	1,128	28	23.3	30	20.3	13	21.8	3.0
New Madrid, Mo	1,003	34	24.2	1	18.0	14	20.2	6.2
Luxora, Ark	905	33	20.2	1	11.7	15, 16	14.1	8.5
Memphis, Tenn	843	33	25.7	1	14.6	16	17.5	11.1
Helena, Ark	767	42	36.9	1	21.8	17, 18	26.0	15.1
Arkansas City, Ark	635	42	43.2	3	28.6	25, 25	25.0	14.6
Greenville, Miss	595	42	36.8	3, 4	23.3	25, 26	29.4	13.5
Vicksburg, Miss	474	45	40.8	6	26.6	28	34.4	14.2
Natchez, Miss	373	46	41.3	7, 8	30.3	30	37.0	11.0
Baton Rouge, La	240	35	30.8	9–11	24.2	30	28.6	6.6
Donaldsonville, La	188	28	24.3	9, 10	18.8	30	22.5	5.5
New Orleans, La	108	16	15.4	10–12	12.4	30	14.3	3.0
Atchafalaya River.								
Simmesport, La	127	33	36.7	7	30.4	30	34.4	6.3
Melville, La	103	31	34.1	7–13	30.7	30	33.0	3.4
Morgan City, La	19	8	5.9	6	3.6	12	4.4	1.4
Grand River.								
Grand Rapids(4)	38	11	18.1	9	3.3	22	11.0	14.8
Mohawk River.								
Tribeshill, N. Y	42	12	4.5	23	−0.4	1	1.5	4.9
Schenectady, N. Y	19	15	5.3	23	0.8	5–10	1.9	4.5
Hudson River.								
Glens Falls, N. Y	197	8	6.7	22, 23	4.0	6	5.3	2.7
Troy, N. Y	154	14	9.0	23	2.5	17	5.4	6.5
Albany, N. Y	147	12	7.0	23	2.5	12	4.3	4.5
Pompton River.								
Pompton Plains, N. J	6	8	4.1	13	3.8	1, 2, 5–12, 15–22, 26, 30	3.8	0.3
Lehigh River.								
Mauchchunk, Pa	45	15	4.4	1, 12, 13	4.1	28–30	4.3	0.3
Schuylkill River.								
Reading, Pa	66	12	0.9	19	0.0	21	0.3	0.9
Delaware River.								
Hancock (E. Branch), N. Y	269	12	3.8	7	2.8	30	3.1	1.0
Hancock (W. Branch), N. Y	269	10	4.1	6, 7, 22, 23	3.0	1–4	3.4	1.1
Port Jervis, N. Y	204	14	1.3	8	0.0	30	0.5	1.3
Phillipsburg, N. J	142	26	1.9	9	0.8	19, 30	1.2	1.1
Trenton, N. J	92	18	1.6	10, 11	1.0	5, 6, 20–23, 28–30	1.2	0.6
North Branch Susquehanna.								
Binghamton, N. Y	183	16	7.6	23	2.2	1–3, 18, 19	3.2	5.4
Towanda, Pa	139	16	9.0	22	1.0	4, 5	2.8	8.0
Wilkesbarre, Pa	60	17	13.3	23	3.4	5	5.7	9.9
West Branch Susquehanna.								
Clearfield, Pa	165	8	3.5	8	1.0	1	1.6	2.5
Williamsport, Pa	39	20	6.0	22	1.6	3, 6	3.4	4.4
Juniata River.								
Huntingdon, Pa	90	24	8.5	7	3.6	6, 30	4.3	4.9
Susquehanna River.								
Selinsgrove, Pa	116	17	5.7	24	1.1	6	2.3	4.6
Harrisburg, Pa	69	17	6.2	25	1.8	4–6	3.1	4.4
Shenandoah River.								
Riverton, Va	58	22	4.5	25	0.4	26	0.9	4.1
Potomac River.								
Cumberland, Md	290	8	4.9	12	2.7	4–7, 9, 10	3.3	2.2
Harpers Ferry, W. Va	172	18	8.0	25	0.0	3	2.0	8.0
James River.								
Buchanan, Va	305	12	6.3	25	2.1	17	3.0	4.2
Lynchburg, Va	260	18	3.9	25	0.3	15–19	1.2	3.6
Columbia, Va	167	18	9.5	24	2.5	20	4.3	7.0
Richmond, Va	111	12	1.8	25	−0.3	18	0.4	2.1
Dan River.								
Danville, Va	55	8	1.4	1	−0.1	23, 30	0.2	1.5
Roanoke River.								
Clarksville, Va	196	12	3.5	1	−0.4	16, 17	0.5	3.9
Weldon, N. C	129	30	17.0	1	8.8	16, 18, 20	10.2	8.2
Tar River.								
Tarboro, N. C	46	25	6.3	27	2.8	14	3.9	3.5
Greenville, N. C	21	22	7.8	28	4.1	13	5.3	3.7
Haw River.								
Moncure, N. C	171	25	9.0	1	1.0	23, 24, 26, 27, 30	2.1	8.0
Cape Fear River.								
Fayetteville, N. C	112	38	19.0	2	3.4	30	7.2	15.6
Waccamaw River.								
Conway, S. C	40	7	4.4	6	2.2	25, 30	3.3	2.2
Pedee River.								
Cheraw, S. C	149	27	7.2	2	1.6	26, 30	2.4	5.6
Smiths Mills, S. C	51	16	12.8	6, 7	2.5	29	6.9	10.3
Lynch Creek.								
Effingham, S. C	35	12	9.7	2	3.2	29, 30	5.4	6.5
Black River.								
Kingstree, S. C. (3)	45	12	8.0	1–3	1.0	29, 30	5.0	7.0
Catawba River.								
Mount Holly, N. C	28	15	3.2	19	1.6	12–18	2.0	1.6
Wateree River.								
Camden, S. C	37	24	9.4	21	3.8	13	5.0	5.6
Broad River.								
Blairs, S. C. (2)	36	.....	1.1	24	0.0	27	0.6	1.1
Saluda River.								
Chappels, S. C. (2)	56	.....	3.9	20	1.1	27	2.2	2.8

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Congaree River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Columbia, S. C	52	15	1.6	28	0.4	15	0.9	1.2
Santee River.								
St. Stephens, S. C	50	12	7.9	1	0.4	16, 17	2.8	7.5
Edisto River.								
Edisto, S. C	75	6	2.9	1	0.0	10-18, 25-30	0.8	2.9
Broad River.								
Carlton, Ga	30	11	3.0	15	1.6	30	2.0	1.4
Savannah River.								
Calhoun Falls, S. C	347	15	3.0	1, 19	1.9	11, 15	2.4	1.1
Augusta, Ga	268	32	8.4	25	6.0	11, 13, 14, 30	7.0	2.4
Oconee River.								
Milledgeville, Ga	147	25	4.7	23	1.4	11, 12	2.2	3.3
Dublin, Ga	79	30	2.2	1	−0.5	12–15	0.4	2.7
Ocmulgee River.								
Macon, Ga	203	18	4.8	23	0.7	12	1.9	4.1
Abbeville, Ga	96	11	5.2	28	1.1	15	2.6	4.1
Flint River.								
Woodbury, Ga	227	10	0.5	16	−0.2	11, 12	0.1	0.7
Montezuma, Ga	152	20	4.0	1	2.0	12, 13	2.7	2.0
Albany, Ga	90	20	3.2	3	1.0	13, 14	1.9	2.2
Bainbridge, Ga	29	22	6.6	1	4.0	15	4.9	2.6
Chattahoochee River.								
Oakdale, Ga	305	18	4.3	1	2.0	14, 15, 20	2.8	2.3
West Point, Ga	239	20	3.1	30	1.6	13, 14	2.3	1.5
Eufaula, Ala	90	40	3.8	1	0.6	14–16	2.0	3.2
Alaga, Ala	30	25	6.7	2	2.5	13	3.7	4.2
Coosa River.								
Rome, Ga	271	30	4.0	24	0.8	11–13	1.9	3.2
Gadsden, Ala	144	22	3.6	1	0.6	16, 17	1.8	3.0
Lock No. 4, Ala	116	17	3.8	1	1.3	13–15	2.5	2.5
Wetumpka, Ala	6	45	9.5	1	3.0	13	4.8	6.5
Tallapoosa River.								
Milstead, Ala	38	35	3.9	30	1.4	10–15	1.8	2.5
Alabama River.								
Montgomery, Ala	265	35	7.5	1	1.0	16	2.4	6.5
Selma, Ala	212	35	12.6	1	1.4	13–19	3.2	11.2
Black Warrior River.								
Tuscaloosa, Ala	90	43	14.4	30	5.0	12–14	6.6	9.4
Tombigbee River.								
Columbus, Miss	303	33	4.5	30	1.0	13–15	2.7	3.5
Vienna, Ala	233	42	4.6	23	0.9	8	2.5	3.7
Demopolis, Ala	155	35	9.7	1	0.2	14	3.0	9.5
Leaf River.								
Hattiesburg, Miss	60	20	4.4	1	3.0	18–22	3.6	1.4
Chickasawhay River.								
Enterprise, Miss	144	18	8.2	28	1.5	12, 13	3.1	6.7
Shubuta, Miss	106	25	12.5	29	3.0	12–14	5.0	9.5
Pascagoula River.								
Merrill, Miss	78	20	9.2	1	2.5	13	4.4	6.7
Pearl River.								
Jackson, Miss	242	20	5.7	1	2.0	20	3.1	3.7
Columbia, Miss	110	14	8.4	1	5.2	21, 22	6.1	3.2
Sabine River.								
Logansport, La	315	25	31.6	2	8.0	21	20.9	23.6
Neches River.								
Rockland, Tex	105	20	19.5	1	1.8	22, 23	8.0	17.7
Beaumont, Tex	18	10	5.5	1	1.2	19, 21	3.2	4.3
Trinity River.								
Dallas, Tex	320	25	25.1	28	5.0	13	8.4	20.1
Long Lake, Tex	211	35	42.0	2	8.3	18	25.5	33.7
Riverside, Tex	112	40	41.4	1	6.3	21	29.6	35.1
Liberty, Tex	20	25	26.9	1–12	20.8	27	25.7	6.1
Brazos River.								
Kopperl, Tex	345	21	7.0	27	2.6	6–8	4.4	4.4
Waco, Tex	285	24	13.6	28	4.2	14	6.1	9.4
Valley Junction, Tex	215	40	20.5	29	4.3	15	8.1	16.2
Hempstead, Tex	140	40	36.2	30	3.1	20	11.8	33.1
Booth, Tex	61	39	32.8	30	4.4	23	11.9	28.4
Colorado River.								
Ballinger, Tex	489	21	4.0	18	1.7	10, 14, 15	2.1	2.3
Austin, Tex	214	18	3.8	2	1.7	21, 22	2.4	2.1
Columbus, Tex	98	24	27.5	27	8.4	25	10.9	19.1
Guadalupe River.								
Gonzales, Tex	112	22	5.0	27, 28	1.3	19-21, 24, 25	1.9	3.2
Victoria, Tex	35	16	13.7	30	3.0	20-22	4.6	10.7
Rio Grande River.								
El Paso, Tex	1,030	14	14.3	1	9.8	30	12.7	4.5
Red River of the North.								
Moorhead, Minn	284	26	10.0	8, 24, 25, 29, 30	9.3	3, 4	9.8	0.7
Kootenai River.								
Bonners Ferry, Idaho	123	24	21.9	9	13.4	30	18.2	8.5
Pend d'Oreille River.								
Newport, Wash	86	14	8.8	17	4.9	1	7.6	3.9
Snake River.								
Lewiston, Idaho	144	24	9.6	3, 10	5.1	30	7.8	4.5
Columbia River.								
Wenatchee, Wash	473	40	30.7	16	21.4	1	27.5	9.3
Umatilla, Oreg	270	25	15.9	13–15	11.8	1	14.4	4.1
The Dalles, Oreg	166	40	25.5	15	17.1	1	22.4	8.4
Willamette River.								
Eugene, Oreg	183	10	5.4	2	2.8	24–26, 30	3.8	2.6
Albany, Oreg	118	20	4.0	7	1.8	21–26	2.6	2.2
Salem, Oreg	84	20	3.2	7, 8	1.0	24, 25	1.8	2.2
Portland, Oreg	12	15	13.6	15–17	8.7	1	11.8	4.9
Sacramento River.								
Red Bluff, Cal	201	23	3.0	1, 2	1.5	30	2.4	1.5
Sacramento, Cal	64	25	17.3	1	11.5	30	14.8	5.8

(2) 16 days only. (3) 27 days only. (4) 17 days only.

Honolulu, T. H., latitude, 21° 19′ north, longitude 157° 52′ west; barometer above sea, 38 feet; gravity correction, —.057 applied. June, 1905.

Day.	Pressure.*		Air temperature.				Moisture.				Wind.				Precipitation.		Clouds.					
							8 a. m.		8 p. m.		8 a. m.		8 p. m.				8 a. m.			8 p. m.		
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	8 a. m.	8 p. m.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.
1	30.02	30.04	76.5	73.5	80	69	65.7	56	66.0	67	ne.	6	e.	9	0.01	0.00	3	Cu.	ne.	6	S.-cu.	e.
2	30.04	30.02	77.4	74.1	80	69	68.0	62	67.0	69	e.	4	n.	4	0.00	0.00	1	Cu.	e.	1	S.-cu.	e.
3	30.04	30.03	76.1	74.5	81	68	71.0	78	68.0	72	ne.	2	ne.	8	0.08	T.	3	Cu.	e.	9	S.-cu.	e.
4	30.06	30.04	77.2	75.0	80	72	68.1	63	67.0	66	ne.	8	e.	10	T.	0.01	1	Cu.	ne.	2	S.-cu.	e.
5	30.05	30.01	76.2	74.2	82	72	68.9	69	69.1	78	ne.	12	ne.	5	0.01	T.	4	Ci.-cu.	0	4	N.	e.
																	1	Cu.	e.			
6	30.02	30.02	76.3	74.1	82	70	70.3	74	67.0	69	e.	6	ne.	3	0.02	T.	2	Cu.	se.	2	S.-cu.	e.
																	6	S.-cu.	se.			
7	30.01	29.99	77.0	73.7	82	70	67.2	60	68.2	76	ne.	3	ne.	5	0.02	T.	2	Cu.	e.	8	N.	e.
8	30.02	30.02	78.0	75.4	81	72	68.6	62	68.0	68	e.	10	e.	15	0.01	0.01	1	Cu.	e.	7	S.-cu.	e.
9	30.07	30.04	74.5	74.5	79	69	67.2	68	65.5	62	e.	15	ne.	5	0.02	0.01	7	S.-cu.	e.	5	Cu.	e.
10	30.07	30.04	73.4	74.1	78	68	66.4	69	66.0	65	ne.	12	ne.	12	0.04	0.01	1	Cu.	e.	7	Cu.	e.
																	6	S.-cu.	e.			
11	30.08	30.05	75.9	74.6	80	70	66.9	62	66.1	64	e.	6	e.	7	0.01	0.01	3	Cu.	e.	2	Cu.	e.
																				3	N.	e.
12	30.04	30.03	76.8	75.0	80	71	67.9	63	66.0	62	ne.	10	ne.	12	T.	T.	1	Cu.	e.	1	S.-cu.	e.
																	2	S.-cu.	e.			
13	30.01	29.97	76.2	74.0	80	66	67.0	62	66.1	65	ne.	14	ne.	12	0.10	0.01	2	Cu.	e.	1	S.-cu.	e.
																				3	N.	e.
14	30.00	29.99	76.1	74.0	81	72	65.8	58	66.0	65	ne.	14	ne.	9	0.01	T.	1	Cu.	e.	1	S.-cu.	e.
15	30.03	30.04	75.4	73.9	80	71	68.4	70	65.1	62	ne.	9	ne.	8	0.01	0.00	1	Cu.	e.	1	Cu.	e.
16	30.07	30.04	76.5	74.3	82	71	66.2	58	65.3	61	e.	7	ne.	8	0.00	0.00	1	Cu.	e.	1	S.-cu.	e.
17	30.07	30.02	74.5	73.3	80	71	67.0	68	65.3	65	ne.	4	ne.	8	T.	T.	3	Ci.-s.	w.	3	Ci.-s.	w.
																	5	N.	e.	1	Cu.	e.
18	30.04	30.00	74.0	73.2	80	69	67.7	72	66.2	69	se.	2	ne.	12	0.01	T.	9	S.-cu.	se.	4	S.-cu.	e.
19	30.00	30.02	75.2	73.5	80	69	67.7	68	64.4	61	ne.	4	e.	9	T.	T.	3	S.-cu.	e.	few.	Cu.	e.
																	4	N.	e.			
20	30.04	30.04	72.2	73.9	79	68	67.8	80	65.4	63	ne.	9	ne.	9	0.05	T.	3	S.-cu.	e.	4	S.-cu.	e.
																	3	N.	e.			
21	30.06	30.02	74.0	73.4	78	69	67.2	70	65.5	65	ne.	6	ne.	11	0.05	0.03	4	S.-cu.	e.	8	N.	e.
																	4	N.	e.			
22	29.90	29.94	75.0	73.0	77	69	66.1	62	66.5	71	ne.	9	ne.	8	0.03	T.	5	Cu.	e.	9	S.-cu.	e.
																	1	S.-cu.	e.			
23	29.97	29.94	71.7	71.4	80	68	66.0	74	66.4	77	ne.	5	ne.	14	0.01	0.00	8	S.-cu.	e.	4	S.-cu.	e.
24	30.03	30.00	74.2	74.6	81	68	67.8	72	69.1	76	sw.	5	ne	10	0.00	0.00	5	Cu.	e.	2	S.-cu.	?
25	30.03	30.01	76.5	75.0	83	70	70.0	72	70.0	78	w.	5	e.	8	0.00	T.	3	Cu.	ne.	4	S.-cu.	e.
26	30.00	29.99	77.3	75.4	84	71	70.5	72	68.5	70	nw.	2	ne.	4	0.00	0.00	3	A.-cu.	w.	1	Ci.-cu.	w.
																	1	Cu.	e.	3	S.-cu.	e.
27	30.01	30.00	79.4	76.4	83	72	71.1	67	69.5	71	ne.	5	ne.	5	0.00	0.00	8	A.-cu.	w.	10	S.-cu.	e.
																	2	Cu.	se.			
28	30.02	30.04	78.0	77.0	79	71	70.2	68	71.0	74	e.	4	e.	5	0.00	T.	9	A.-cu.	0	10	N.	se.
29	30.06	30.03	77.0	75.3	79	72	72.0	79	69.3	74	se.	3	ne.	4	T.	T.	3	Cu.	e.	1	S.-cu.	ne.
																	1	S.-cu.	e.			
30	30.04	30.03	78.0	75.3	83	71	68.2	61	69.8	76	ne.	6	ne.	5	0.00	T.	1	S.-cu.	e.	6	N.	e.
31																						
Mean....	30.033	30.015	75.9	74.3	80.5	69.9	68.1	67.3	67.1	68.7	ne.	6.9	ne.	8.1	0.49	0.09	4.6	Cu.	e.	4.5	S.-cu.	e.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5h and 30m slower than 75th meridian time. *Pressure values are reduced to sea level and standard gravity.

COSTA RICAN CLIMATOLOGICAL DATA.

Communicated by Mr. H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San José de Costa Rica, during June, 1905.*

Hours.	Pressure.	Temperature.	Relative humidity.	Rainfall.		Sunshine.	Cloudiness.	Temperature of the soil at depth of—			
				Amount.	Duration.			6 inches.	12 inches.	24 inches.	48 inches.
	Inches.	° *F.*	%	*Ins.*	*Hrs.*	*Hrs.*	%	° *F.*	° *F.*	° *F.*	° *F.*
1 a. m	26.12	65.2	92	0.10	1.00	.....	.....	.....	.....	.....	.....
2 a. m	26.10	64.8	93	0.06	0.50	.....	.....	.....	.....	.....	.....
3 a. m	26.09	64.1	93	0.06	1.34	.....	.....	.....	.....	.....	.....
4 a. m	26.08	63.9	91	.....	.....	.....	.....	.....	.....	.....	.....
5 a. m	26.08	63.4	93	.....	.....	.....	.....	.....	.....	.....	.....
6 a. m	26.09	63.1	92	.....	.....	.....	.....	.....	.....	.....	.....
7 a. m	26.10	64.3	90	.....	.....	8.88	67	.....	.....	.....	.....
8 a. m	26.11	68.5	78	0.13	0.83	16.19	.....	.....	.....	.....	.....
9 a. m	26.12	71.9	73	0.10	1.00	16.71	.....	.....	.....	.....	.....
10 a. m	26.13	74.6	70	0.09	1.00	16.34	72	.....	.....	.....	.....
11 a. m	26.12	76.3	68	0.06	1.42	13.72	.....	.....	.....	.....	.....
Noon	26.12	77.3	67	.....	.....	8.52	.....	.....	.....	.....	.....
1 p. m	26.10	78.4	65	.....	.....	15.96	82	.....	.....	.....	.....
2 p. m	26.09	77.5	68	0.06	0.43	15.47	.....	.....	.....	.....	.....
3 p. m	26.07	75.4	71	0.97	2.78	11.24	.....	.....	.....	.....	.....
4 p. m	26.06	73.6	74	1.16	4.17	8.37	92	.....	.....	.....	.....
5 p. m	26.06	70.5	83	2.87	6.16	4.37	.....	.....	.....	.....	.....
6 p. m	26.08	69.2	86	1.49	8.41	1.33	.....	.....	.....	.....	.....
7 p. m	26.09	67.9	86	1.03	7.53	.....	88	.....	.....	.....	.....
8 p. m	26.10	67.1	90	0.89	8.16	.....	.....	.....	.....	.....	.....
9 p. m	26.12	66.7	90	0.35	5.33	.....	.....	.....	.....	.....	.....
10 p. m	26.13	66.3	90	0.11	4.17	.....	76	.....	.....	.....	.....
11 p. m	26.13	65.7	92	0.09	2.16	.....	.....	.....	.....	.....	.....
Midnight	26.13	65.6	93	1.10	1.00	.....	.....	.....	.....	.....	.....
Mean	26.10	69.3	83	.....	.....	.....	81	.....	.....	.....	.....
Min	26.01	59.4	34	.....	.....	.....	.....	.....	.....	.....	.....
Max	26.19	86.0	100	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	10.72	58.39	137.10	.....	.....	.....	.....	.....

REMARKS.—At San José the barometer is 3835 feet above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 5 feet above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. The standard rain gage is 5 feet above ground. Since January 1, 1902, observations at San José have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds *in advance* of San José local time.

TABLE 2.—*Rainfall at stations in Costa Rica, June, 1905.*

Stations.	Rainfall.		Stations.	Rainfall.	
	Amount.	Number of days.		Amount.	Number of days.
	Inches.			*Inches.*	
Swamp Mouth	0.94	19	Paraiso	7.13	17
San Carlos	9.21	19	Las Concavas	6.89	25
Las Lomas	1.54	19	La Verbana	8.43	23
Peralta	1.14	14	Nuestro Amo	7.24	15
Juan Vinas	0.35	17	Puntarenas	10.20	14
Santiago	4.53	8	.....	.....	.....

Notes on earthquakes.—June 5, 3h 58m p. m., NE.–SE., intensity I, duration 3 seconds; June 5, 8h 35m p. m., shock NE.–SE., intensity I, duration 2 seconds. June 17, 2h 50m p. m., NW.–SE., intensity I, duration 2 seconds. June 21, shock almost imperceptible, 10h 30m p. m. June 26, 2h 45m p. m., NW.–SE., intensity I, duration 2 seconds.

MEXICAN CLIMATOLOGICAL DATA.

By Señor MANUEL E. PASTRANA, Director of the Central Meteorologic-Magnetic Observatory.

June, 1905.

Stations.	Altitude.	Mean barometer.*	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inches.*	° *F.*	° *F.*	° *F.*	%	*Ins.*		
Aguascalientes (Seminario.)	6,330	24.06	87.3	54.3	67.5	59	1.17	ne.	.....
C. Juarez	3,805	24.47	97.5	62.6	81.1	77	2.27	ne, ese.	.....
Colima Seminario	1,663	28.42	100.6	69.4	79.7	77	5.21	sw.	.....
Cuhacan Rosales	112	29.55	101.1	71.6	89.8	64	1.70	sw.	.....
Chihuahua	4,684	25.20	97.7	58.6	77.2	50	4.74	e.	.....
Guadalajara (Seminario.)	5,186	24.92	86.7	57.2	69.6	72	7.62	wnw.	.....
Hugotitan Hda (Jalasco.)	5,228	24.84	86.7	48.2	68.9	85	6.46	se.	.....
Jalapa	4,681	25.46	76.6	53.2	66.2	89	16.90	n.	.....
Leon	5,906	24.25	90.0	55.0	72.1	62	4.28	s.	.....
Linares	1,188	28.56	100.4	68.0	83.1	66	3.03	sse.	.....
Mazatlan	25	29.79	92.5	74.5	84.7	74	1.68	w.	e., ne.
Merida	50	29.75	97.9	70.2	82.4	74	4.07	ne.	.....
Mexico (Obs. Cent.)	7,472	22.99	82.4	52.2	63.7	64	4.92	n.	ne.
Morelia (Seminario)	6,401	23.87	82.4	55.8	64.8	75	4.93	.....	.....
Oaxaca	5,063	24.90	91.2	53.6	71.8	72	7.85	w.	.....
Panal	5,674	24.48	89.2	59.0	73.4	.....	0.53	e.	.....
Puebla (Col. d Est.)	7,118	23.28	79.0	50.4	62.8	76	6.19	ne.	.....
San Juan de Ulnor	39	29.81	88.5	69.6	80.6	83	21.66	e.	.....
Zacatecas	8,015	22.50	84.6	46.9	62.6	66	5.42	e.	.....

*The monthly barometric means are reduced to the international standard of gravity.

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Chart I. Tracks of Centers of High Areas, June, 1905.

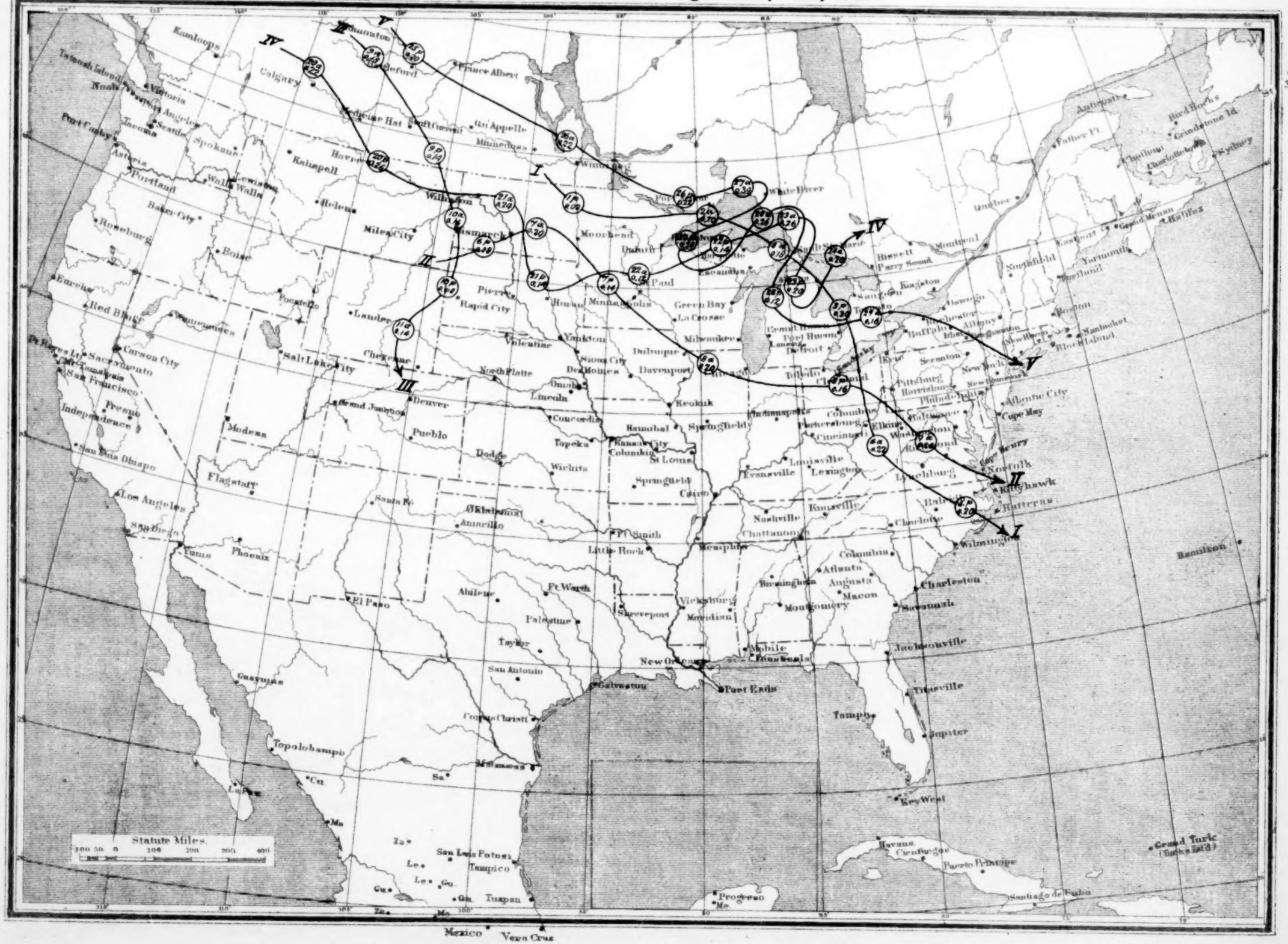

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Chart II. Tracks of Centers of Low Areas, June, 1905.

Chart III. Total Precipitation, June, 1905.

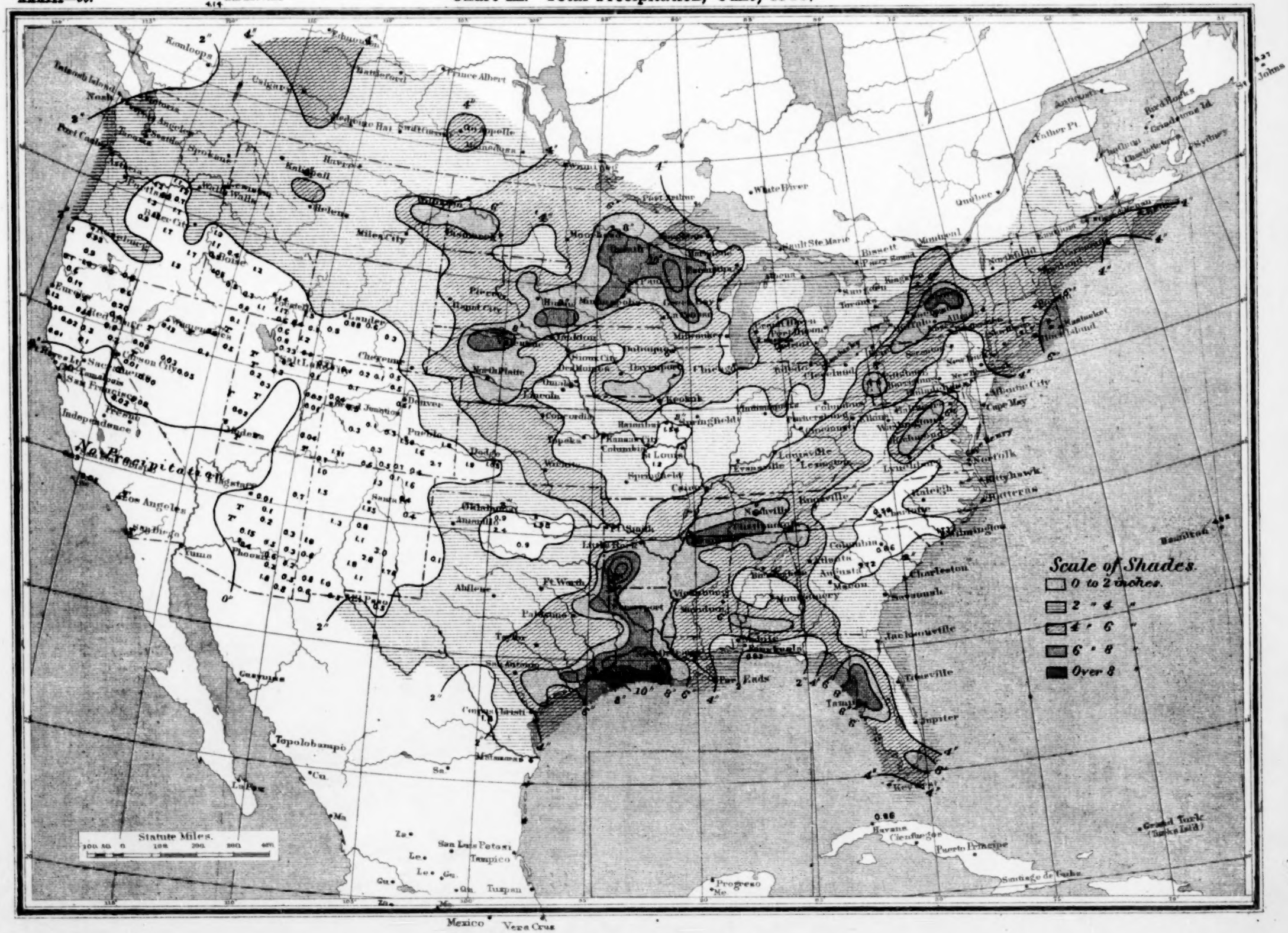

Chart IV. Percentage of Clear Sky, June, 1905.

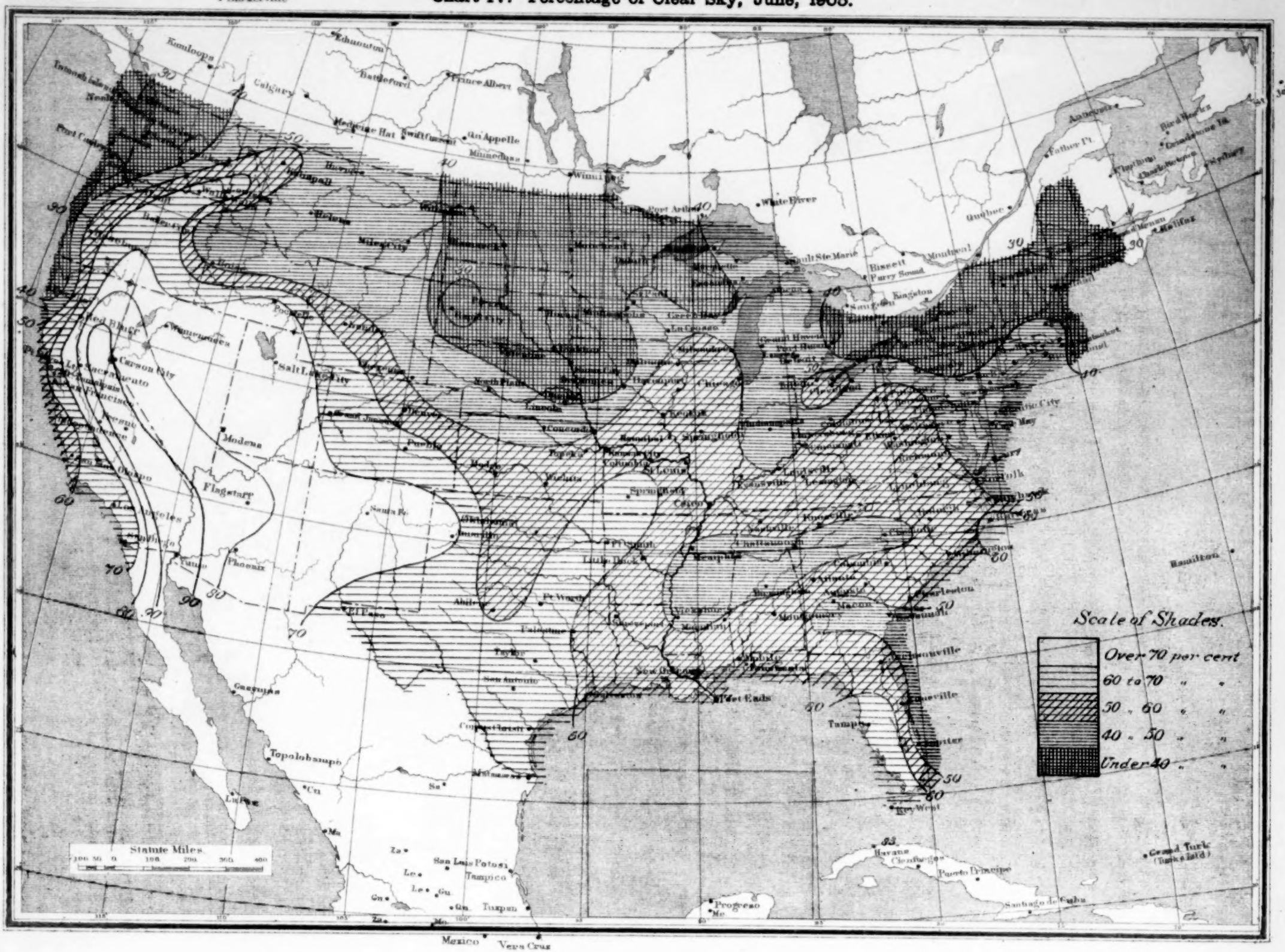

Chart V. Hydrographs for Seven Principal Rivers of the United States, June, 1905.

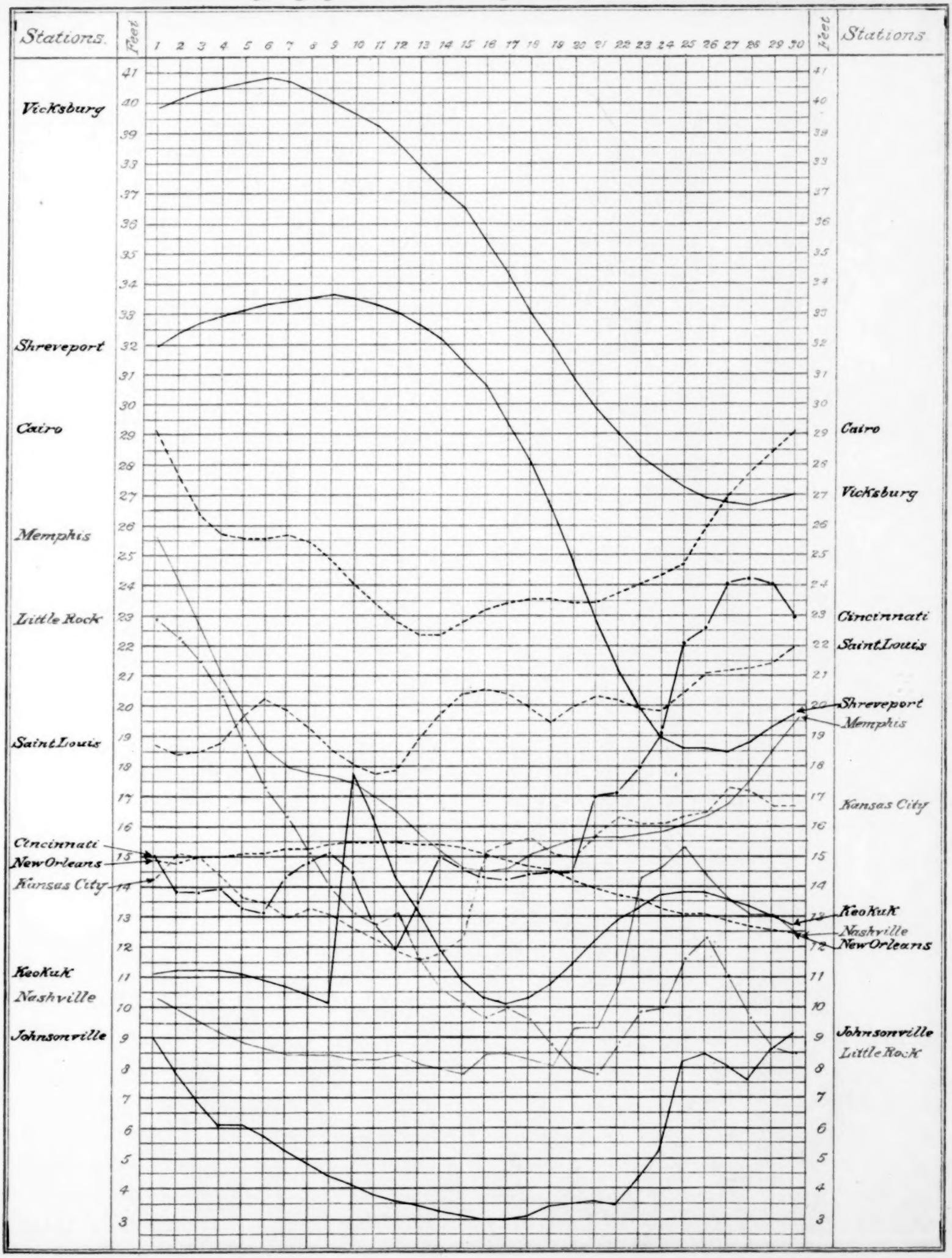

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Chart VI. Isobars and Isotherms at 10,000 feet, June, 1905.

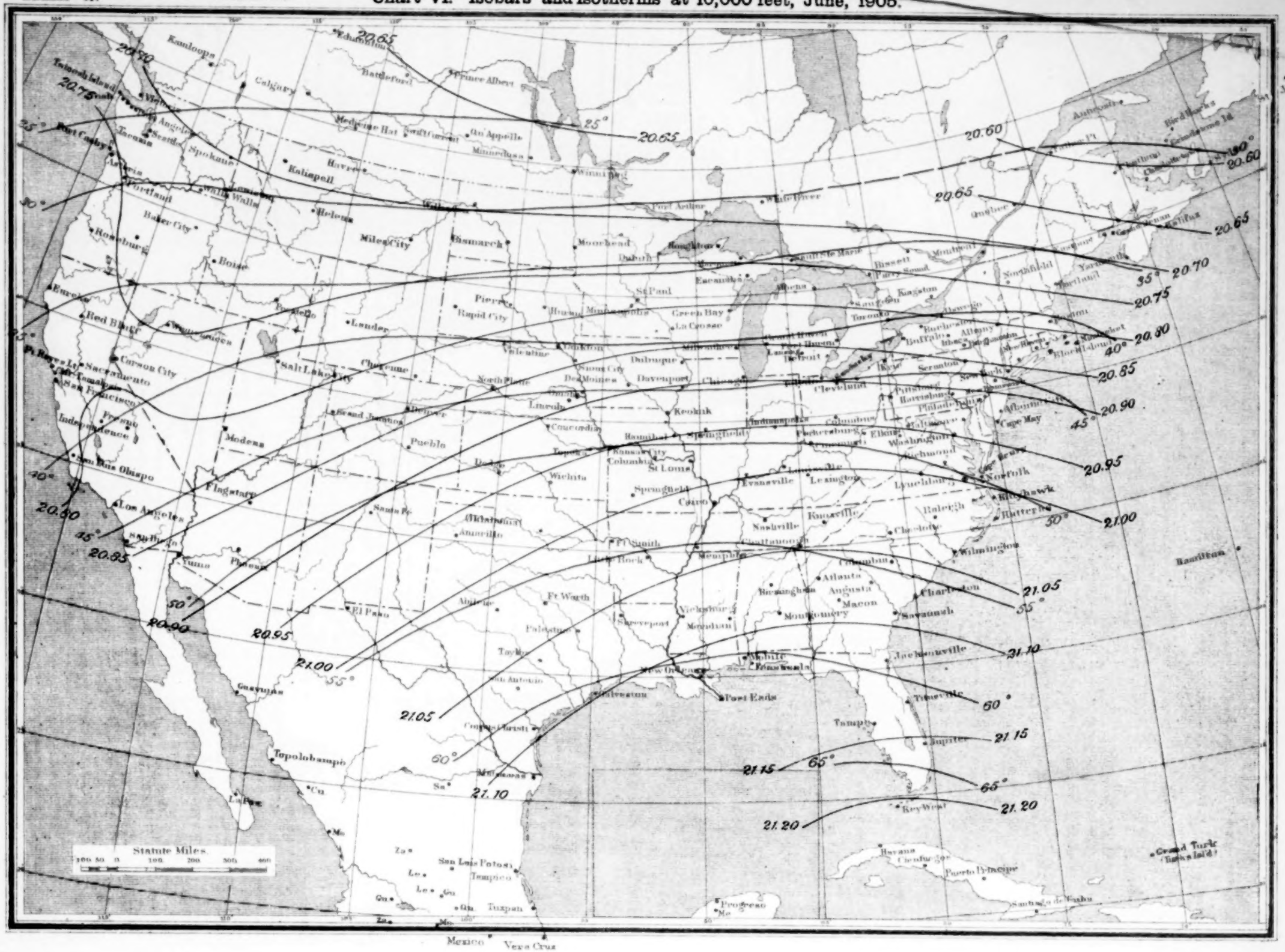

Chart VII. Isobars and Isotherms at 3500 feet, June, 1905.

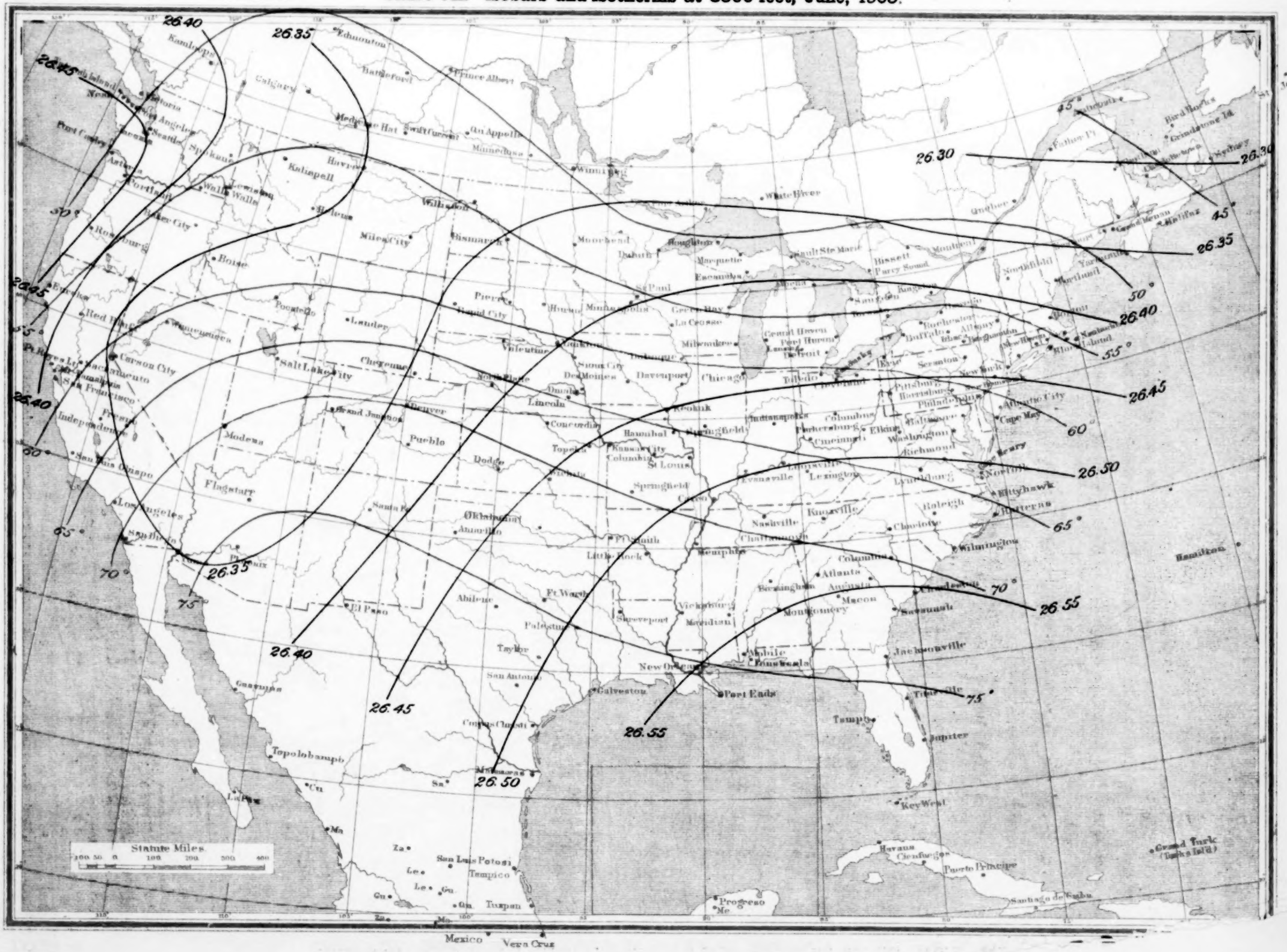

Chart VIII. Isobars and Isotherms at Sea Level; Resultant Surface Winds, June, 1905.

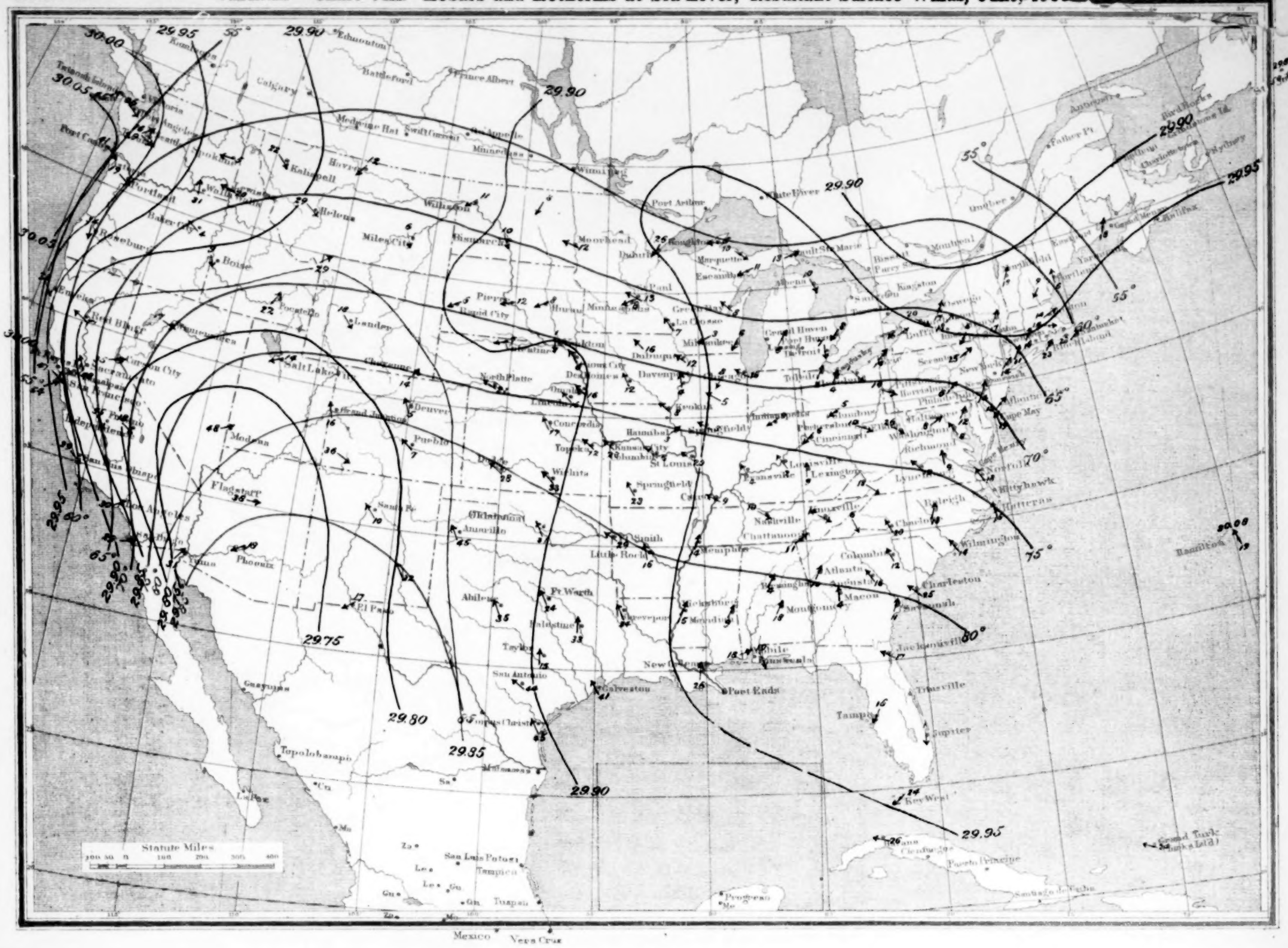

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Chart IX. Sea-Level Isobars, Surface Temperatures, and Resultant Winds, June, 1905.
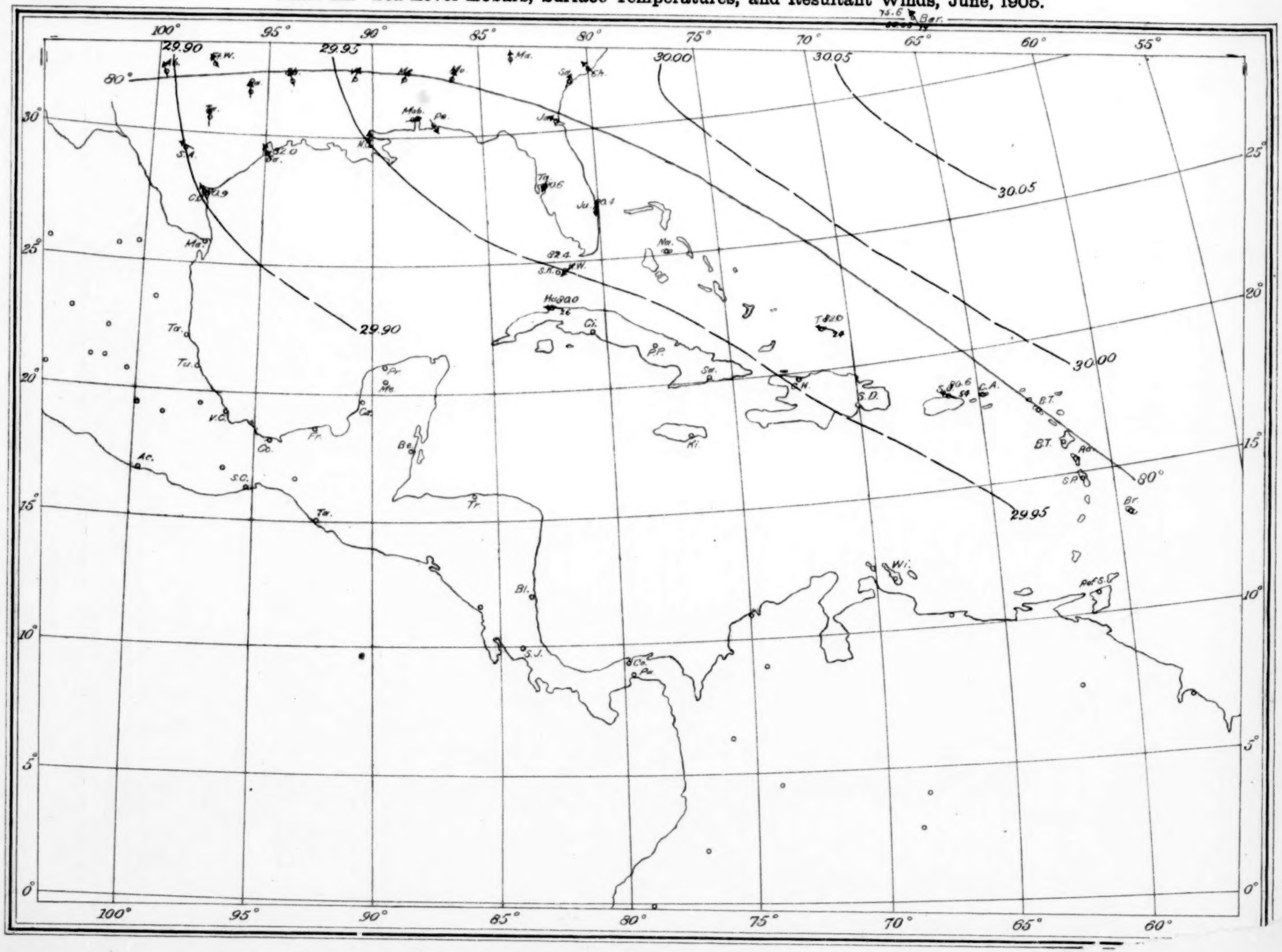
Chart IX. Sea-Level Isobars, Surface Temperatures, and Resultant Winds, June, 1905.